

**1993 ANNUAL RCRA  
GROUNDWATER MONITORING  
REPORT FOR REGULATED UNITS  
AT THE ROCKY FLATS PLANT**

**—ADDENDUM—**

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**EG&G Rocky Flats, Inc.  
Environmental Management Department**

**ADMIN RECORD**

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## **EXECUTIVE SUMMARY**

In compliance with Colorado Hazardous Waste Act regulations 6 CCR 1007-3, subpart F, section 265.94 for interim-status waste management units, this addendum to the 1993 Annual Resource Conservation and Recovery Act (RCRA) Groundwater Monitoring Report presents final results of the 1993 quarterly sampling and analysis of groundwater from the three regulated, interim-status RCRA units (Solar Evaporation Ponds, West Spray Field, and Present Landfill) at the Rocky Flats site. The purpose of the RCRA groundwater-monitoring program at Rocky Flats is to monitor and determine the impact from RCRA-regulated units to groundwater in the uppermost hydrostratigraphic unit. This addendum presents updated chemical-concentration and radionuclide-activity data and updated statistical comparisons of upgradient to downgradient water quality for each of the regulated units.

At the time of the preparation of this addendum, approximately 49,000 analytical results, of which 83 percent have been validated, were reviewed. Approximately 1 percent of the validated results were rejected.

Revisions to the 1993 report include addition to and revision of the analytical databases, an update of tables of infrequently detected analytes in downgradient monitoring wells, an update of results of statistical comparisons of groundwater quality upgradient and downgradient of the RCRA-regulated units, and inclusion of additional analytical results to supplement incomplete box plots and chemical isoconcentration maps.

The addition of new fourth-quarter data did not significantly change descriptions of groundwater quality or interpretations of contaminant migration at the RCRA-regulated units. Some analytes were detected with a different frequency or had concentrations with different distribution types (i.e., normal, lognormal, nonparametric) than originally reported. The results of the comparative statistics, however, were not greatly affected by these changes. Therefore, based on a review and analysis of additional data, the descriptions of impacts to groundwater included in the 1993 Annual RCRA Groundwater Monitoring Report were not changed.

The results of inter-year comparisons of upgradient to downgradient groundwater quality at each of the RCRA-regulated units indicate that the types of contaminants present and the impacts to groundwater in the uppermost hydrostratigraphic unit at the downgradient compliance boundary have not varied from year to year (1991 - 1993).

## **1.0 INTRODUCTION**

This addendum to the 1993 Annual RCRA Groundwater Monitoring Report for Regulated Units at the Rocky Flats site completes the information required under the Colorado Hazardous Waste Act regulations 6 CCR 1007-3, subpart F, section 265.94. Data presented in this addendum include updated and additional results of organic and inorganic analytes in groundwater at the three regulated units (Solar Evaporation Ponds, West Spray Field, and Present Landfill) at the Rocky Flats site; these data were not yet available during preparation of the 1993 report.

Additional groundwater-quality data include the analytical results from samples collected during the fourth quarter of 1993. Approximately 12,000 additional records were extracted from the Rocky Flats Environmental Database System (RFEDS) and, of these, approximately 8,000 results were added to the original database (March 1, 1994 report) to prepare this addendum. Duplicate records of the same sample analyses were not included. The updated database contains approximately 49,000 records and is provided in Appendix A. Within Appendix A, data are divided into four groups: water-quality parameters, metals, radionuclides, and organic compounds (VOCs, semivolatile organic compounds, pesticides, and PCBs).

Data presented in this addendum are in the process of being validated in accordance with Environmental Management Program quality-assurance procedures. At the time this addendum was prepared, 40,462 of 48,931 results had been reviewed for validation. Of these results, only 1.3 percent were rejected.

Revisions to the 1993 report include amended and revised analytical databases (Appendix A); updated calculations of percent of validated results; updated tables of infrequently detected analytes in downgradient monitoring wells; updated results of statistical comparisons of groundwater quality at upgradient and downgradient monitoring well locations (Appendix B); tables providing supplemental, fourth-quarter analytical results for the analytes shown on box plots and chemical isoconcentration maps.

Because groundwater elevation data were available for all quarters of 1993 prior to preparation of the 1993 RCRA Report, no additional water-level data were incorporated in this addendum. Therefore, it was not necessary to update the

potentiometric-surface maps and calculated flow velocities presented in the 1993 report.

Previous interpretations of the groundwater-quality data are discussed in the following sections. These interpretations may have been revised based on new information provided in the updated database. New data and revised interpretations of the 1993 groundwater-monitoring results are provided in Sections 2, 3, and 4.

In addition to updates to the groundwater-quality data, this addendum presents the results of statistical analyses conducted on datasets from 1993 and two previous years, 1991 and 1992. The statistical analyses were performed to compare upgradient to downgradient groundwater quality using the same analysis-of-variance (ANOVA) methods as were used to evaluate the 1993 groundwater-quality data. For data from each year (1991, 1992, 1993), identical pools of upgradient and downgradient wells were used to group analytical results from each of the RCRA-regulated units prior to performing the comparative statistics. In this manner, the results of the statistical evaluations from all three years have been made directly comparable within each of the units. The statistical methodology and the results of the inter-year comparisons are presented in Section 5 and Appendix C.

## **2.0 SOLAR EVAPORATION PONDS**

Additional fourth-quarter analytical results were incorporated into the existing database for the Solar Evaporation Ponds. The statistical analyses discussed in Section 1.4.7 of the 1993 report were performed using the updated database. Tables 2-4 through 2-9 present the fourth-quarter analytical results for the analytes posted on the distribution maps included with the 1993 report. These tables supplement the existing maps and were used to update the discussion of groundwater quality at the Solar Evaporation Ponds.

### **2.1 Infrequently Detected Analytes**

Table 2-1 lists the concentrations of infrequently detected analytes in groundwater of the upper hydrostratigraphic unit (UHSU - refer to discussion in Section 1.3 of 1993 report) for samples collected from wells downgradient of the Solar Evaporation Ponds. Analytes are classified as infrequently detected if they are detected in less than 50 percent of the samples collected from the RCRA-regulated unit. Addition of the fourth-quarter data resulted in addition of carbonate, lead, silver, and zinc to the list of analytes that were detected infrequently in UHSU groundwater from the Solar Evaporation Ponds. The detected concentrations of the infrequently detected analytes, including carbonate, lead, silver, and zinc, in UHSU groundwater collected downgradient of the solar ponds are reported in Table 2-1.

### **2.2 ANOVA Comparisons**

Tables 2-2 and 2-3 summarize the results of statistical comparisons of upgradient to downgradient water quality in the UHSU based on recalculation of ANOVA tests using the updated database for 1993. The analytes listed in these tables were detected in at least 50 percent of the groundwater samples. The distribution types (i.e., normal, lognormal, or nonparametric) and probability values are also presented. The probability value (P) indicates the probability (1-P) that the differences in analyte concentrations are statistically significant.

In the UHSU (Table 2-2), total americium-241, dissolved selenium, and total suspended solids—in addition to the previously reported list of analytes—were identified as having higher average concentrations in downgradient wells relative to upgradient wells. In the UHSU surficial materials (Table 2-3), dissolved radium-226, uranium-233,234, uranium-235, and uranium-238 were added to the list of

radionuclides with higher activities at some downgradient monitoring wells relative to the upgradient pool. Dissolved barium was also found to have a higher concentration at well P208989 than in the upgradient wells but had lower concentrations at wells P209489 and 3086 than in the upgradient pool. Statistically significant increases in the concentrations of bicarbonate and total suspended solids were also identified in downgradient relative to upgradient groundwater in the UHSU bedrock.

## 2.3 Groundwater Quality

Distribution maps for select analytes were prepared and included with the 1993 report. The maps are not complete, however, due to data not yet recorded for fourth-quarter samples. The fourth-quarter results from the Solar Evaporation Ponds have been compiled in Tables 2-4 through 2-9 for the analytes shown on distribution maps. These tables include activities of total and dissolved radionuclides, in addition to concentrations of VOCs, nitrate plus nitrite, total dissolved solids, and dissolved lithium. These tables can be used in conjunction with Figures 3-10 through 3-27 of the 1993 report to evaluate the distribution of some groundwater contaminants. The concentrations that exceed the background concentrations of these analytes are highlighted with bold text in the tables.

The fourth-quarter results for radionuclides are reported in Tables 2-4 and 2-5 and confirm the results previously reported in the 1993 report. Total tritium, americium-241, and plutonium-239,240 were present at activities exceeding background in the same wells where their activities were consistently high during the first three quarters of 1993. Tritium, americium, and plutonium activities remained elevated above background in groundwater from UHSU surficial deposits adjacent to the east side of the solar ponds and in wells downgradient of the unit within the Walnut Creek drainage area. Groundwater in UHSU bedrock between the solar ponds and the groundwater intercept system also contains elevated activities of radionuclides relative to background activities.

VOCs were detected in groundwater from UHSU surficial materials at several wells (05093, 05193, 1786, 3586, P209789, P219189, P219489, and P219589) located downgradient of the solar ponds area and at two wells (2286 and 5687) located immediately upgradient of the solar ponds during the fourth quarter (Table 2-6). Groundwater in the weathered bedrock portions of the UHSU contained detectable concentrations of VOCs in wells 02691, 3086, P207789, P208989, P209389, P209489,

P210089, and P210189 during the fourth quarter. Again, these results are consistent with those reported for the previous three quarters of 1993.

Concentrations of nitrate plus nitrite exceeded background values at most of the UHSU monitoring wells during the fourth quarter (Table 2-7). Nitrate plus nitrite concentrations were especially high in samples collected from wells 05093, 3086, P208989, and P209889. These wells are located adjacent to the solar ponds where nitrate plus nitrite concentrations were highest during the first three quarters of 1993 (refer to Figures 3-20 and 3-21 in 1993 report). Nitrate plus nitrite concentrations also remained high in the vicinity of wells 1786 and B210489 in the Walnut Creek drainage north of the solar ponds. In the immediate vicinity of the solar ponds, total dissolved solids and dissolved lithium concentrations showed distribution patterns similar to those of nitrate plus nitrite.

The occurrence and magnitude of these analytes during the fourth quarter of 1993 do not alter any previous conclusions about the distribution of contaminants at the Solar Evaporation Ponds in 1993.

### **3.0 WEST SPRAY FIELD**

Additional analytical results for fourth-quarter samples were incorporated into the existing database for the West Spray Field. The statistical analyses discussed in Section 1.4.7 of the 1993 report were performed using the updated database. Tables 3-3 through 3-8 present the fourth-quarter results for the analytes posted on the distribution maps included with the 1993 report. These tables supplement the existing maps and were used to update the discussion of groundwater quality at the West Spray Field.

#### **3.1 Infrequently Detected Analytes**

Table 3-1 lists the analytes detected infrequently in UHSU groundwater downgradient of the West Spray Field. Analytes were classified as infrequently detected if they were detected in fewer than 50 percent of the samples for any given well. Table 3-1 also lists the concentrations of these infrequently detected analytes in downgradient groundwater.

Additional fourth-quarter data resulted in classification of dissolved arsenic as an analyte detected in greater than 50 percent of the samples and dissolved zinc as an infrequently detected analyte. The concentrations of zinc in downgradient wells are reported in Table 3-1.

#### **3.2 ANOVA Comparisons**

Table 3-2 summarizes the results of statistical comparisons of upgradient to downgradient water quality in the UHSU; these results are based on recalculation of ANOVA tests using the updated database for 1993. Analytes tested by ANOVA were detected in at least 50 percent of the samples. The distribution types (i.e., normal, lognormal, or nonparametric) and probability values are also presented. The probability value (P) indicates the probability (1-P) that the differences in analyte concentrations are statistically significant.

With the addition of fourth-quarter data, there were several minor variations in the results of the statistical comparisons. Dissolved gross alpha was added to the list of analytes with higher concentrations in downgradient compared to upgradient UHSU groundwater. Sulfate and dissolved silicon were identified as having higher

concentrations in UHSU groundwater upgradient of the West Spray Field than in downgradient UHSU groundwater at wells B110989 and B410589, respectively.

### 3.3 Groundwater Quality

Tables 3-3 through 3-8 present analytical data for the fourth quarter of 1993. These tables include, respectively, total radionuclide activities, dissolved radionuclide activities, VOCs, nitrate plus nitrite, total dissolved solids, and chloride concentrations. These tables can be used in conjunction with Figures 4-6 through 4-13 in the 1993 report to evaluate the distribution these analytes during 1993. The concentrations of these analytes that exceed the background concentration are shown in bold text in the tables.

The fourth-quarter analytical results for radionuclide activities confirm that radionuclides are not generally present in UHSU groundwater from the West Spray Field at activities higher than their activities in background groundwater. Only one sample collected from B111189 had a plutonium-239,240 activity higher than the background activity during the fourth quarter (Table 3-3). No other radionuclides were present at activities exceeding background activities.

VOCs were detected in two samples from wells within the West Spray Field. Chloroform was present in the weathered-bedrock groundwater from well 46392; trichlorobenzene and methylene chloride were present in downgradient wells 1490 and 5685, respectively.

Nitrate plus nitrite, total dissolved solids, and chloride had the highest concentrations in UHSU groundwater from downgradient (east) of the West Spray Field. The concentrations of these analytes did not exceed their background concentrations in groundwater from wells located within the West Spray Field or from wells located along the downgradient compliance boundary of the RCRA-regulated unit. The wells where these analytes were found present at concentrations exceeding background are located approximately 1,000 feet east of (downgradient of) the compliance boundary for the West Spray Field. These wells (P415889, P416089, P416189) lie outside of the regulated unit and are within the industrial area of the Rocky Flats site.

The results reported for the fourth quarter are consistent with the results reported in the 1993 report and none of the conclusions made in that report need to be modified based on the additional fourth-quarter data.

## **4.0 PRESENT LANDFILL**

Additional analytical results for fourth-quarter samples were incorporated into the existing database for the Present Landfill. The statistical analyses discussed in Section 1.4.7 of the 1993 report were performed using the updated database. Tables 4-4 through 4-9 present the fourth-quarter results for the analytes posted on the distribution maps included with the 1993 report. These tables supplement the existing maps and were used to update the discussion of groundwater quality at the Present Landfill.

### **4.1 Infrequently Detected Analytes**

Table 4-1 lists the analytes detected infrequently in UHSU groundwater downgradient of the Present Landfill. Analytes were classified as infrequently detected if they were detected in fewer than 50 percent of the samples for any given well. Table 4-1 also lists the concentrations of these infrequently detected analytes in downgradient groundwater.

Several analytes not listed on Table 5-5 of the 1993 report were added to the infrequently detected list. Dissolved arsenic and tin, carbonate, chemical oxygen demand, and orthophosphate were detected infrequently in water sampled from well B207089.

### **4.2 ANOVA Comparisons**

Tables 4-2 and 4-3 summarize the results of statistical comparisons of upgradient to downgradient water quality in the UHSU based on recalculation of ANOVA tests using the updated database for 1993. The distribution types (i.e., normal, lognormal, or nonparametric) and probability values also presented. The probability value (P) indicates the probability (1-P) that the differences in analyte concentrations are statistically significant.

Additional analytical results for dissolved strontium-89,90, bicarbonate, total dissolved solids, total organic carbon, and tritium moved these analytes into the "greater than 50-percent detection" category. Comparative statistics indicate that no statistical difference exists at the 0.05 significance level between concentrations of strontium-89,90, total organic carbon, and tritium in UHSU groundwater upgradient and downgradient of the Present Landfill. Concentrations for bicarbonate and total

dissolved solids in UHSU groundwater from downgradient well B207089 were statistically greater than the mean concentrations of these analytes in upgradient wells.

Updating the 1993 database did not change the results of comparative statistics for groundwater in the UHSU bedrock (Table 4-3).

#### 4.3 Groundwater Quality

Tables 4-4 through 4-9 present analytical data for the fourth quarter of 1993. These tables include, respectively, total radionuclide activities and dissolved radionuclide activities, as well as concentrations of VOCs, total dissolved solids, chloride, and dissolved calcium. These tables can be used in conjunction with Figures 5-6 through 5-18 in the 1993 report to evaluate the distribution of contaminants during all four quarters of 1993. Results for analytes that are shown in bold-faced type in Tables 4-4 through 4-9 exceed sitewide background values for those naturally occurring analytes. These values, if plotted on Figures 5-6 through 5-18, would be highlighted in red to indicate that the reported result exceeded sitewide background.

Radionuclide activities elevated above background values during the fourth quarter of 1993 were measured in samples from wells 72093 (total plutonium-239,240, tritium, and dissolved radium-226), 72393 (tritium and dissolved radium-226 and strontium-89,90), and B206589 (total plutonium-239,240 and dissolved radium-226). Major ions elevated above background values during the fourth quarter of 1993 included total dissolved solids (in wells 72093, 72293, 72393, B206789, B207089, and 6487), chloride (in wells 72093, 72293, 72393, B206789, B207089, B206589, and B206689), and dissolved calcium (wells 72093, 72293, and B207089). The occurrence and magnitude of these analytes during the fourth quarter of 1993 did not alter any previous conclusions regarding the distribution of contaminants at the Present Landfill presented in the 1993 report.

## **5.0 RESULTS OF INTER-YEAR STATISTICAL COMPARISONS**

The results of statistical evaluations comparing groundwater quality upgradient of the RCRA-regulated units to downgradient groundwater quality have been reported in Annual RCRA Groundwater Monitoring Reports since 1991 (DOE 1992, 1993, 1994). The statistical results reported in these documents are not directly comparable, however, because slightly different pools of upgradient and downgradient wells were used to make the statistical comparisons. In an attempt to make the results of the statistical evaluations from different years more comparable, the comparisons for 1991, 1992, and 1993 were each performed again using a consistent pool of upgradient and downgradient wells. Table 5-1 presents the wells making up the pools of upgradient and downgradient wells for each of the RCRA-regulated units. The upgradient and downgradient pools include some wells screened in surficial materials and some wells screened in weathered bedrock portions of the UHSU. The list of wells included in the inter-year statistical comparison is slightly different than that used to make the statistical comparisons for the 1993 report. Fewer wells were included in the pools for the inter-year comparison because many of the wells used in the 1993 report did not exist in the previous years, and a direct comparison of the results from all three years would have been impossible.

For each of the units, three identical comparisons were made using data from 1991, 1992, and 1993. In every case, the statistical comparisons were made using the methods described in Section 1.4.7 of the 1993 report. Tables 5-2 through 5-10 present the results of the statistical analyses for the three RCRA-regulated units as discussed below. The distribution types (i.e., normal, lognormal, or nonparametric) and probability values are also presented in these tables. The probability value (P) indicates the probability (1-P) that the differences in analyte concentrations are statistically significant.

### **5.1 Solar Evaporation Ponds**

In general, the same analytes are consistently present at higher concentrations in the downgradient wells. Table 5-11 identifies the analytes that have higher concentrations in downgradient relative to upgradient groundwater at the 0.05 significance level. An analyte is included on this table if the concentrations at one or more downgradient wells were higher than the concentration in the upgradient pool. The metals that were

present at higher concentrations in downgradient groundwater relative to upgradient groundwater during all three years include dissolved calcium, lithium, magnesium, manganese, sodium, and strontium. Dissolved aluminum, antimony, chromium, molybdenum, potassium, selenium, and tin were present at higher concentrations in downgradient versus upgradient groundwater during one or two years. The radionuclides that were present at higher concentrations in downgradient groundwater include dissolved gross alpha, gross beta, uranium-233,234, uranium-235, and uranium-238, and total tritium. Dissolved radium-226 was higher in downgradient groundwater relative to upgradient groundwater only during 1993.

- The downgradient wells where radionuclide activities were elevated relative to upgradient activities are not consistent from year to year. For example, tritium activities in well P209589 were generally higher than in the upgradient pool during 1991 but not during 1992 (Tables 5-2 and 5-3). The tritium activities in groundwater from wells P208989 and 3086 were higher than in the upgradient pool during 1992.

Seven of the water-quality parameters were consistently present at higher concentrations in downgradient groundwater relative to upgradient groundwater. Bicarbonate, chloride, fluoride, nitrate plus nitrite, sulfate, total dissolved solids, and total suspended solids were found at higher concentrations in downgradient groundwater relative to upgradient groundwater during 1991, 1992, and 1993. A consistent group of downgradient wells (2686, 3086, P208989, P209489, P209589) yielded groundwater with higher concentrations of total dissolved solids relative to concentrations in the upgradient pool wells. This consistent group of downgradient wells is located east of the solar ponds area.

## 5.2 West Spray Field

At the West Spray Field, only a few analytes were present at consistently higher concentrations in downgradient groundwater relative to upgradient groundwater (Table 5-12). Dissolved barium, calcium, magnesium, sodium, and strontium were present at higher concentrations at some downgradient monitoring wells during all three years evaluated. Dissolved gross alpha, uranium-233,234, and uranium-238 were present at higher concentrations downgradient of the West Spray Field relative to upgradient only during 1991 and 1992. Bicarbonate, chloride, and fluoride were consistently elevated in the downgradient groundwater relative to upgradient groundwater, and total dissolved solids were elevated during 1991 and 1992. Nitrate plus nitrite

concentrations were not higher at downgradient well locations compared to the concentrations in the upgradient well pool during any of the years evaluated.

### **5.3 Present Landfill**

At the Present Landfill, dissolved calcium, lithium, magnesium, potassium, sodium, and strontium were present at higher concentrations in downgradient groundwater compared to upgradient groundwater during 1991, 1992, and 1993 (Table 5-13). None of the radionuclides was present at consistently higher concentrations in the downgradient wells than in the upgradient wells. The dissolved gross alpha activity was higher downgradient than upgradient in 1991; dissolved gross beta, uranium-233,234, and uranium-238 activities were higher in 1991 and 1992 (Table 5-13). Water-quality parameters are more consistently elevated in downgradient groundwater relative to upgradient groundwater. Bicarbonate, chloride, fluoride, sulfate, and total dissolved solids were all found at higher concentrations in the downgradient UHSU wells compared to their concentrations in the upgradient pool.

### **5.4 Summary**

The results of comparable, inter-year statistical evaluations demonstrate that the same analytes are present at consistently higher concentrations in groundwater from downgradient of the RCRA-regulated unit from year to year. The analytes present vary slightly among the three RCRA-regulated units, but in general this list of analytes includes calcium, magnesium, potassium, sodium, strontium, the uranium isotopes, bicarbonate, chloride, fluoride, and total dissolved solids. These analytes are naturally occurring constituents of groundwater but can also originate from man-made sources of waste disposal or release. At the Solar Evaporation Ponds, nitrate plus nitrite, lithium, manganese, gross alpha, gross beta, tritium, sulfate, and total suspended solids are also present at consistently higher concentrations downgradient of the unit compared to upgradient of the unit. Downgradient groundwater at the West Spray Field also contains higher concentrations of the above-listed analytes, with the exception of potassium. At the Present Landfill, sulfate is an addition to the list.

## **6.0 REFERENCES**

DOE (U.S. Department of Energy). 1992. 1991 Annual RCRA Groundwater Monitoring Report for Regulated Units at the Rocky Flats Plant. March 1.

DOE. 1993. 1992 Annual RCRA Groundwater Monitoring Report for Regulated Units at the Rocky Flats Plant. March 1.

DOE. 1994. 1993 Annual RCRA Groundwater Monitoring Report for Regulated Units at the Rocky Flats Plant. February 23.

## **TABLES**

**Table 1-1 Data-Validation Summary**

Analyte Group	Total Number of Results	Number Validated	(Number Rejected)	Percent Validated	(Percent Rejected)
Dissolved Metals	9,638	8,246	(59)	85.6	(0.6)
Total Metals	4,023	3,530	(30)	87.7	(0.7)
Dissolved Radionuclides	2,842	1,945	(11)	68.4	(0.4)
Total Radionuclides	1,304	804	(13)	61.7	(1.0)
Organic Compounds <sup>1</sup>	26,857	22,151	(509)	82.5	(1.9)
Water Quality Parameters <sup>2</sup>	<u>4,267</u>	<u>3,786</u>	(10)	<u>88.7</u>	<u>(0.2)</u>
<b>TOTAL</b>	<b>48,931</b>	<b>40,462</b>	<b>(632)</b>	<b>82.7</b>	<b>(1.3)</b>

1 Organic compounds include volatile organic compounds, semivolatile organic compounds, pesticides, herbicides and polychlorinated biphenyls.

2 Water-quality parameters include major anions (ammonia, bicarbonate, carbonate, chloride, chemical oxygen demand, cyanide, fluoride, nitrate plus nitrate, orthophosphate, sulfate, sulfide, total dissolved solids, total organic carbon, total suspended solids, total organic halides, total organic halogens).

Table 2-1 Infrequently Detected Analytes (less than 50% Quantifiable Results).  
Concentrations in Downgradient UHSU Groundwater at the Solar Evaporation Ponds

VOCs in Downgradient UHSU Groundwater			
Well	Date	Analyte	Result
P209489	02/19/93	1,2-Dichloroethene	10 µg/L
P209489	07/22/93	1,2-Dichloroethene	10 µg/L
P209489	10/15/93	1,2-Dichloroethene	11 µg/L
P209689	07/20/93	2-Hexanone	11 µg/L
05093	08/03/93	Benzene	.1 µg/L
05093	10/18/93	Benzene	0.2 µg/L
P207589	04/12/93	Carbon disulfide	2 µg/L
P209489	02/19/93	Carbon tetrachloride	48 µg/L
P209489	04/07/93	Carbon tetrachloride	75 µg/L
P209489	07/22/93	Carbon tetrachloride	57 µg/L
P209489	10/15/93	Carbon tetrachloride	46 µg/L
05093	06/15/93	Chloroform	0.2 µg/L
05093	08/03/93	Chloroform	.5 µg/L
05093	10/18/93	Chloroform	0.6 µg/L
05193	06/16/93	Chloroform	0.3 µg/L
05193	08/02/93	Chloroform	.3 µg/L
05193	10/18/93	Chloroform	0.3 µg/L
P209489	02/19/93	Chloroform	21 µg/L
P209489	04/07/93	Chloroform	25 µg/L
P209489	10/15/93	Chloroform	21 µg/L
05093	10/18/93	Methylene chloride	1 µg/L
05193	06/16/93	Methylene chloride	2 µg/L
05193	08/02/93	Methylene chloride	.3 µg/L
3086	10/20/93	Methylene chloride	8 µg/L
P207689	04/12/93	Methylene chloride	3 µg/L
P207789	10/14/93	Methylene chloride	1 µg/L
P208989	10/22/93	Methylene chloride	4 µg/L
05093	06/15/93	Tetrachloroethene	0.2 µg/L
05093	08/03/93	Tetrachloroethene	.5 µg/L
05093	10/18/93	Tetrachloroethene	0.5 µg/L
05193	06/16/93	Tetrachloroethene	11 µg/L
05193	08/02/93	Tetrachloroethene	11 µg/L
05193	10/18/93	Tetrachloroethene	13 µg/L
3086	02/04/93	Tetrachloroethene	2 µg/L
P208989	02/10/93	Tetrachloroethene	1 µg/L
P208989	04/23/93	Tetrachloroethene	1 µg/L
P208989	10/22/93	Tetrachloroethene	1 µg/L
P209489	02/19/93	Tetrachloroethene	4 µg/L
P209489	04/07/93	Tetrachloroethene	5 µg/L
P209489	07/22/93	Tetrachloroethene	5 µg/L
P209489	10/15/93	Tetrachloroethene	4 µg/L
P209789	02/09/93	Tetrachloroethene	3 µg/L
P209789	04/06/93	Tetrachloroethene	2 µg/L
P209789	10/15/93	Tetrachloroethene	3 µg/L
05093	10/18/93	Toluene	0.3 µg/L
05093	06/15/93	Trichloroethene	0.3 µg/L
05093	08/03/93	Trichloroethene	1 µg/L

Table 2-1 Infrequently Detected Analytes (less than 50% Quantifiable Results) (continued).  
 Concentrations in Downgradient UHSU Groundwater at the Solar Evaporation Ponds

VOCs in Downgradient UHSU Groundwater (continued)			
Well	Date	Analyte	Result
05093	10/18/93	Trichloroethene	1 µg/L
05193	06/16/93	Trichloroethene	15 µg/L
05193	08/02/93	Trichloroethene	18 µg/L
05193	10/18/93	Trichloroethene	16 µg/L
2686	02/05/93	Trichloroethene	3 µg/L
2686	04/12/93	Trichloroethene	2 µg/L
2686	07/30/93	Trichloroethene	3 µg/L
2686	10/11/93	Trichloroethene	6 µg/L
P209489	02/19/93	Trichloroethene	72 µg/L
P209489	04/07/93	Trichloroethene	84 µg/L
P209489	07/22/93	Trichloroethene	75 µg/L
P209489	10/15/93	Trichloroethene	70 µg/L
P209789	02/09/93	Trichloroethene	2 µg/L
P209789	04/06/93	Trichloroethene	2 µg/L
P209789	10/15/93	Trichloroethene	4 µg/L

  

Dissolved Metals in Downgradient UHSU Groundwater			
Well	Date	Analyte	Result
P207889	02/09/93	Aluminum	82.6 µg/L
P209789	07/16/93	Antimony	22.3 µg/L
05093	10/18/93	Arsenic	4.1 µg/L
3086	02/04/93	Arsenic	1 µg/L
3086	10/20/93	Arsenic	3.1 µg/L
P208989	02/10/93	Arsenic	14 µg/L
P208989	10/22/93	Arsenic	1 µg/L
P209489	02/19/93	Arsenic	1 µg/L
P209789	07/16/93	Arsenic	1.2 µg/L
P208989	02/10/93	Beryllium	4.1 µg/L
05193	06/16/93	Cadmium	2.4 µg/L
P208989	02/10/93	Cadmium	2.8 µg/L
P209489	07/22/93	Cadmium	2.80 µg/L
P208989	04/23/93	Cesium	60.00 µg/L
P208989	10/22/93	Cesium	80 µg/L
P209489	10/15/93	Cesium	90 µg/L
P209789	07/16/93	Cesium	100 µg/L
P209789	10/15/93	Cesium	130 µg/L
05093	06/15/93	Cobalt	6.70 µg/L
3086	02/04/93	Cobalt	3.3 µg/L
P208989	04/23/93	Cobalt	4.20 µg/L
P208989	10/22/93	Cobalt	4.1 µg/L
P209789	10/15/93	Cobalt	3.1 µg/L
05093	06/15/93	Copper	2.40 µg/L
3086	02/04/93	Copper	3.6 µg/L
3086	04/21/93	Copper	5.6 µg/L
P209489	02/19/93	Copper	2.6 µg/L
P209789	07/16/93	Copper	2.2 µg/L

Table 2-1 Infrequently Detected Analytes (less than 50% Quantifiable Results) (continued).  
 Concentrations in Downgradient UHSU Groundwater at the Solar Evaporation Ponds

Dissolved Metals in Downgradient UHSU Groundwater (continued)			
Well	Date	Analyte	Result
P207689	02/10/93	Iron	62.1 µg/L
P207889	02/09/93	Iron	97.5 µg/L
05093	10/18/93	Lead	1 µg/L
05093	10/18/93	Mercury	1.1 µg/L
P207889	02/09/93	Mercury	.35 µg/L
P208989	02/10/93	Mercury	.23 µg/L
P209489	07/22/93	Mercury	0.26 µg/L
05193	06/16/93	Molybdenum	23.9 µg/L
05193	10/18/93	Molybdenum	29.1 µg/L
05093	06/15/93	Nickel	31.80 µg/L
05093	10/18/93	Nickel	53.1 µg/L
05193	06/16/93	Nickel	22.1 µg/L
3086	02/04/93	Nickel	18.4 µg/L
3086	04/21/93	Nickel	16.1 µg/L
P207689	02/10/93	Nickel	8.9 µg/L
P208989	04/23/93	Nickel	7.80 µg/L
P209489	02/19/93	Nickel	9.7 µg/L
P207689	04/12/93	Silver	5.1 µg/L
05193	06/16/93	Tin	78.8 µg/L
3086	04/21/93	Tin	32 µg/L
P207689	10/18/93	Tin	40 µg/L
P207889	07/20/93	Tin	46.6 µg/L
P209489	04/07/93	Tin	40.70 µg/L
P209789	02/09/93	Tin	35.8 µg/L
P209789	07/16/93	Tin	21.5 µg/L
3086	02/04/93	Vanadium	5.8 µg/L
3086	10/20/93	Vanadium	5 µg/L
P207689	10/18/93	Vanadium	5.4 µg/L
P207889	07/20/93	Vanadium	5.7 µg/L
P208989	10/22/93	Vanadium	5.9 µg/L
P209489	10/15/93	Vanadium	20.6 µg/L
P209789	10/15/93	Vanadium	16.7 µg/L
05093	06/15/93	Zinc	514.00 µg/L
05193	06/16/93	Zinc	5.2 µg/L
P207689	02/10/93	Zinc	8.8 µg/L
P207689	04/12/93	Zinc	26.1 µg/L
P207889	02/09/93	Zinc	20.4 µg/L
P207889	07/20/93	Zinc	4.1 µg/L
P208989	02/10/93	Zinc	10.2 µg/L
P209489	07/22/93	Zinc	38.70 µg/L
P209789	02/09/93	Zinc	5.3 µg/L
P209789	07/16/93	Zinc	3 µg/L

Table 2-1 Infrequently Detected Analytes (less than 50% Quantifiable Results) (continued).  
 Concentrations in Downgradient UHSU Groundwater at the Solar Evaporation Ponds

Inorganic Parameters in Downgradient UHSU Groundwater			
Well	Date	Analyte	Result
05093	10/18/93	Carbonate	2100.0 µg/L
05193	10/18/93	Carbonate	5950.00 µg/L
2686	10/11/93	Carbonate	2340.00 µg/L
3086	10/20/93	Carbonate	3660.00 µg/L
P207689	10/18/93	Carbonate	2780.00 µg/L
05193	10/18/93	Cyanide	9.000 µg/L
3086	04/21/93	Cyanide	13.000 µg/L
P207689	02/10/93	Cyanide	4.4 µg/L
P207689	07/30/93	Cyanide	2.10 µg/L
05093	10/18/93	Orthophosphate	4.000 µg/L
05193	10/18/93	Orthophosphate	5.000 µg/L
2686	02/05/93	Orthophosphate	30.00 µg/L
2686	07/30/93	Orthophosphate	40.00 µg/L
3086	10/20/93	Orthophosphate	13.000 µg/L
P207689	07/30/93	Orthophosphate	20.00 µg/L
P207689	10/18/93	Orthophosphate	5.000 µg/L
P209489	02/19/93	Orthophosphate	10.00 µg/L
P209789	10/15/93	Orthophosphate	10.00 µg/L

Table 2-2 Comparative Statistics for the Solar Evaporation Ponds - UHSU

Analyte	ANOVA Method <sup>1</sup>	Probability Value	Well Comparison
<b>Dissolved</b>			
Barium	Nonparametric	0.0008	#
Calcium	Nonparametric	0.0009	* Pool - 3086, P208989, P209489, 5093
Gross Alpha	Nonparametric	0.0003	* Pool - 5193, 5093, 3086, P209489, P208989
Gross Beta	Nonparametric	0.0004	* Pool - 5193, 3086, 5093, P209489
Lithium	Nonparametric	0.0003	* Pool - 3086, P208989, 5093, P209489, 5193
Magnesium	Nonparametric	0.0004	* Pool - P207689, 5093, 3086, P207889, P208989
Manganese	Nonparametric	0.0010	* Pool - P209489, 5093, 5193
Potassium	Nonparametric	0.0009	* Pool - P209489, 5093, 5193
Radium-226	Nonparametric	0.0206	* Pool - P208989
Selenium	Nonparametric	0.0014	* Pool - P207689, P207889, P208989
Silicon	Nonparametric	0.0007	#
Sodium	Lognormal	0.0001	* Pool - 3086, P208989, P209489, P207889, P207689, P209789, 5193, 5093
Strontium	Nonparametric	0.0003	* Pool - P208989, P207689, 3086, 5093
Strontium-89,90	Nonparametric	0.4165	**
Total Radiocesium	Nonparametric	0.9639	**
Uranium-233,234	Nonparametric	0.0008	* Pool - 5193, 5093, 3086, P208989, P209489
Uranium-235	Nonparametric	0.0012	* Pool - 5193, 5093, 3086, P209489
Uranium-238	Nonparametric	0.0009	* Pool - 5193, 5093, 3086, P209489, P208989
<b>Totals</b>			
Americium-241	Nonparametric	0.0327	* Pool - 5193
Bicarbonate as CaCO <sub>3</sub>	Nonparametric	0.0003	* Pool - 2686, 3086, 5093, 5193, P207689
Chloride	Nonparametric	0.0004	* Pool - P207989, 5093, P209589

Table 2-2 Comparative Statistics for the Solar Evaporation Ponds - UHSU (continued)

Analyte	ANOVA Method <sup>1</sup>	Probability Value	Well Comparison
Fluoride	Lognormal	0.0001	* Pool - 2686, 5193, 3086, P207689, P207989, P207889, P209789
Nitrate/Nitrite	Nonparametric	0.0001	* Pool - 3086, P208989, 5093, 5193, P209489, P209589
Plutonium-239,240	Nonparametric	0.0870	**
Sulfate	Nonparametric	0.0005	* Pool - P207889, 2686, P207989, P209589
Total Dissolved Solids	Nonparametric	0.0001	* Pool - 3086, P208989, P209489, P209589, 5093, 5193
Total Suspended Solids	Nonparametric	0.0047	* Pool - P207689
Tritium	Nonparametric	0.0001	* Pool - 05193

<sup>1</sup> Normal = Data were normally distributed and analyzed using parametric ANOVA methods.

Lognormal = Data were transformed using natural logarithms prior to parametric ANOVA analysis.

Nonparametric = Data were analyzed using distribution-free nonparametric ANOVA methods.

- # Identifies a statistically significant difference between some locations. However, no statistical difference exists between the mean upgradient concentration and the concentration in compliance wells.
- Indicates that the analyte concentrations in the downgradient wells are statistically greater than the mean upgradient concentration.
- \*\* Indicates that no statistical difference exists between upgradient and downgradient analyte concentrations at the 0.05 significance level.

Table 2-3 Comparative Statistics for the Solar Evaporation Ponds - UHSU Bedrock

Analyte	ANOVA Method <sup>1</sup>	Probability Value	Well Comparison
Dissolved			
Barium	Lognormal	0.0001	* P209489, 3086 - Pool
Calcium	Lognormal	0.0001	* Pool - P208989
Gross Alpha	Nonparametric	0.0053	* Pool - 3086, P208989,
Gross Beta	Nonparametric	0.0059	P209489
Lithium	Nonparametric	0.0045	* Pool - 3086, P208989
Magnesium	Lognormal	0.0001	* Pool - P208989, 3086,
Manganese	Nonparametric	0.0047	P209489
Potassium	Lognormal	0.0001	* Pool - P209489,
Radium-226	Nonparametric	0.0164	P208989, 3086
Silicon	Normal	0.0001	#
Sodium	Nonparametric	0.0026	* Pool - 3086, P208989
Strontium	Lognormal	0.0001	* Pool - P208989; 3086,
Strontium-89,90	Nonparametric	0.5901	P209489
Total Radiocesium	Nonparametric	0.7265	**
Uranium-233,234	Nonparametric	0.0081	* Pool - P208989, 3086
Uranium-235	Nonparametric	0.0167	* Pool - P209489
Uranium-238	Nonparametric	0.0144	* Pool - P208989
Total			
Americium-241	Nonparametric	0.0589	**
Bicarbonate as CaCO <sub>3</sub>	Normal	0.0001	* Pool - 3086
Chloride	Nonparametric	0.0021	* Pool - P207989,
Fluoride	Lognormal	0.0001	P209589
Nitrate/Nitrite	Nonparametric	0.0011	* Pool - P207989, 3086
Plutonium-239,240	Nonparametric	0.3099	* Pool - P207989
Sulfate	Nonparametric	0.0034	* Pool - P209589,
Total Dissolved Solids	Lognormal	0.0001	P208989, 3086,
Total Suspended Solids	Nonparametric	0.0127	P207989, P209489
Tritium	Normal	0.0001	* Pool - 3086
			* Pool - 3086, P208989,
			P209489

**Table 2-3 Comparative Statistics for the Solar Evaporation Ponds - UHSU Bedrock (continued)**

1 Normal = Data were normally distributed and analyzed using parametric ANOVA methods.  
Lognormal = Data were transformed using natural logarithms prior to parametric ANOVA analysis.  
Nonparametric = Data were analyzed using distribution-free nonparametric ANOVA methods.

- # Identifies a statistically significant difference between some locations. However, no statistical difference exists between the mean upgradient concentration and the concentration in compliance wells.
- Indicates that the analyte concentrations in the downgradient wells are statistically greater than the mean upgradient concentration.
  - \*\* Indicates that no statistical difference exists between upgradient and downgradient analyte concentrations at the 0.05 significance level.

**Table 2-4 Activities of Total Radionuclides in UHSU Groundwater at the  
Solar Evaporation Ponds, 4th Quarter, 1993**

Well	Date	Surficial Materials Analyte	Result <sup>1</sup>	Units
05093	10/18/93	Tritium	5,505.91	pCi/L
05193	10/18/93	Americium-241	0.161	pCi/L
05193	10/18/93	Plutonium-239,240	0.043362	pCi/L
05193	10/18/93	Tritium	5,079.46	pCi/L
1386	10/28/93	Plutonium-239,240	0.006	pCi/L
1386	10/28/93	Tritium	.92	pCi/L
1586	10/20/93	Americium-241	0.018	pCi/L
1586	10/20/93	Plutonium-239,240	0.0008113	pCi/L
1586	10/20/93	Tritium	129.17	pCi/L
1786	10/29/93	Americium-241	0.0061157	pCi/L
1786	10/29/93	Plutonium-239,240	0.012113	pCi/L
1786	10/29/93	Tritium	760.34	pCi/L
2187	11/03/93	Tritium	233.95	pCi/L
2286	10/13/93	Tritium	438.89	pCi/L
3586	12/13/93	Americium-241	0.004	pCi/L
3586	12/13/93	Plutonium-239,240	0.003	pCi/L
3586	12/13/93	Tritium	.70	pCi/L
5687	10/15/93	Tritium	1,197.65	pCi/L
B208089	10/26/93	Tritium	150	pCi/L
B210489	10/20/93	Americium-241	0.007	pCi/L
B210489	10/20/93	Plutonium-239,240	0.0007386	pCi/L
B210489	10/20/93	Tritium	636.97	pCi/L
P207689	10/18/93	Americium-241	0.0085428	pCi/L
P207689	10/18/93	Plutonium-239,240	0.0163393	pCi/L
P207689	10/18/93	Tritium	94.48	pCi/L
P209789	10/15/93	Americium-241	0.01	pCi/L
P209789	10/15/93	Plutonium-239,240	0.003088	pCi/L
P209789	10/15/93	Tritium	1,088.65	pCi/L
P218389	11/16/93	Tritium	52	pCi/L
P219189	11/18/93	Tritium	580	pCi/L
P219489	11/16/93	Tritium	270	pCi/L

Well	Date	Weathered Bedrock Analyte	Result <sup>1</sup>	Units
02691	11/30/93	Americium-241	0.002843	pCi/L
02691	11/30/93	Plutonium-239,240	0.0019425	pCi/L
02691	11/30/93	Tritium	657.73	pCi/L
3086	10/20/93	Americium-241	0.006	pCi/L
3086	10/20/93	Plutonium-239,240	0.0056854	pCi/L
3086	10/20/93	Tritium	1,956.33	pCi/L
B208689	10/28/93	Tritium	-250	pCi/L
P207389	10/12/93	Americium-241	0.01	pCi/L
P207389	10/12/93	Plutonium-239,240	0.0053155	pCi/L
P207389	10/12/93	Tritium	460.87	pCi/L

Table 2-4 Activities of Total Radionuclides in UHSU Groundwater at the Solar Evaporation Ponds, 4th Quarter, 1993 (continued)

Well	Date	Analyte	Weathered Bedrock Result <sup>1</sup>	Units
P207589	10/13/93	Tritium	59.28	pCi/L
P207789	10/14/93	Tritium	9.86	pCi/L
P207989	10/14/93	Tritium	-55.73	pCi/L
P208989	10/22/93	Americium-241	<b>0.055</b>	pCi/L
P208989	10/22/93	Plutonium-239,240	0	pCi/L
P208989	10/22/93	Tritium	<b>2,100</b>	pCi/L
P209089	10/21/93	Tritium	-230	pCi/L
P209389	10/19/93	Americium-241	0.007	pCi/L
P209389	10/19/93	Plutonium-239,240	0.0043756	pCi/L
P209389	10/19/93	Tritium	262.17	pCi/L
P209489	10/15/93	Americium-241	0.009	pCi/L
P209489	10/15/93	Plutonium-239,240	0.0009889	pCi/L
P209489	10/15/93	Tritium	<b>1,120.81</b>	pCi/L
P209889	10/21/93	Americium-241	0.11	pCi/L
P209889	10/21/93	Plutonium-239,240	<b>0.083</b>	pCi/L
P209889	10/21/93	Tritium	<b>6,300</b>	pCi/L
P210089	10/20/93	Tritium	58.34	pCi/L
P210189	10/22/93	Americium-241	<b>0.015</b>	pCi/L
P210189	10/22/93	Plutonium-239,240	<b>0.067</b>	pCi/L
P210189	10/22/93	Tritium	<b>640</b>	pCi/L

1 Results shown in bold-faced type exceed sitewide background value (mean plus two standard deviations) for that analyte.

Table 2-5 Activities of Dissolved Radionuclides in UHSU Groundwater at the Solar Evaporation Ponds, 4th Quarter, 1993

Well	Date	Surficial Materials		Units
		Analyte	Result <sup>1</sup>	
05093	10/18/93	Gross alpha	291.736	pCi/L
05093	10/18/93	Gross beta	275.024	pCi/L
05093	10/18/93	Radium-226	5.5	pCi/L
05093	10/18/93	Uranium-233,234	282.814	pCi/L
05093	10/18/93	Uranium-235	12.0849	pCi/L
05093	10/18/93	Uranium-238	176.642	pCi/L
05193	10/18/93	Gross alpha	313.728	pCi/L
05193	10/18/93	Gross beta	235.243	pCi/L
05193	10/18/93	Radium-226	0.036	pCi/L
05193	10/18/93	Uranium-233,234	258.04	pCi/L
05193	10/18/93	Uranium-235	12.5442	pCi/L
05193	10/18/93	Uranium-238	115.571	pCi/L
1386	10/28/93	Gross alpha	13	pCi/L
1386	10/28/93	Gross beta	5	pCi/L
1386	10/28/93	Radium-226	0.46	pCi/L
1386	10/28/93	Uranium-233,234	13	pCi/L
1386	10/28/93	Uranium-235	0.22	pCi/L
1386	10/28/93	Uranium-238	9.7	pCi/L
1586	10/20/93	Gross alpha	10.5507	pCi/L
1586	10/20/93	Gross beta	12.476	pCi/L
1586	10/20/93	Radium-226	0.31	pCi/L
1586	10/20/93	Strontium-89,90	0.152	pCi/L
1586	10/20/93	Uranium-233,234	17.7286	pCi/L
1586	10/20/93	Uranium-235	1.35663	pCi/L
1586	10/20/93	Uranium-238	13.9054	pCi/L
1786	10/29/93	Gross alpha	67.1222	pCi/L
1786	10/29/93	Gross beta	16.1605	pCi/L
1786	10/29/93	Radium-226	0.6	pCi/L
1786	10/29/93	Strontium-89,90	0.153	pCi/L
1786	10/29/93	Uranium-233,234	42.9193	pCi/L
1786	10/29/93	Uranium-235	1.1107	pCi/L
1786	10/29/93	Uranium-238	31.7475	pCi/L
2286	10/13/93	Gross alpha	5.26923	pCi/L
2286	10/13/93	Gross beta	10.9681	pCi/L
2286	10/13/93	Radium-226	0.28	pCi/L
2286	10/13/93	Uranium-233,234	6.08099	pCi/L
2286	10/13/93	Uranium-235	0.868713	pCi/L
2286	10/13/93	Uranium-238	2.57834	pCi/L
3586	12/13/93	Gross alpha	3.3	pCi/L
3586	12/13/93	Gross beta	2	pCi/L
3586	12/13/93	Strontium-89,90	0.33	pCi/L
3586	12/13/93	Uranium-233,234	2.4	pCi/L
3586	12/13/93	Uranium-235	0.032	pCi/L
3586	12/13/93	Uranium-238	2.1	pCi/L
B210489	10/20/93	Gross alpha	62.2759	pCi/L

Table 2-5 Activities of Dissolved Radionuclides in UHSU Groundwater at the Solar Evaporation Ponds, 4th Quarter, 1993 (continued)

Well	Date	Surficial Materials		Units
		Analyte	Result <sup>1</sup>	
B210489	10/20/93	Gross beta	11.8788	pCi/L
B210489	10/20/93	Radium-226	0.23	pCi/L
B210489	10/20/93	Strontium-89,90	0.756	pCi/L
B210489	10/20/93	Uranium-233,234	33.2741	pCi/L
B210489	10/20/93	Uranium-235	1.50163	pCi/L
B210489	10/20/93	Uranium-238	26.0619	pCi/L
P207689	10/18/93	Gross alpha	12.0834	pCi/L
P207689	10/18/93	Gross beta	-0.265802	pCi/L
P207689	10/18/93	Radium-226	0.28	pCi/L
P207689	10/18/93	Strontium-89,90	0.12	pCi/L
P207689	10/18/93	Uranium-233,234	7.19542	pCi/L
P207689	10/18/93	Uranium-235	0.293192	pCi/L
P207689	10/18/93	Uranium-238	6.56017	pCi/L
P209789	10/15/93	Gross alpha	13.5757	pCi/L
P209789	10/15/93	Gross beta	6.7183	pCi/L
P209789	10/15/93	Radium-226	0.95	pCi/L
P209789	10/15/93	Strontium-89,90	-0.0841	pCi/L
P209789	10/15/93	Uranium-233,234	12.4042	pCi/L
P209789	10/15/93	Uranium-235	0.871692	pCi/L
P209789	10/15/93	Uranium-238	6.41565	pCi/L
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Well	Date	Weathered Bedrock		Units
		Analyte	Result <sup>1</sup>	
02691	11/30/93	Gross alpha	7.21794	pCi/L
02691	11/30/93	Gross beta	5.30673	pCi/L
02691	11/30/93	Radium-226	0.332	pCi/L
02691	11/30/93	Strontium-89,90	-0.0645	pCi/L
02691	11/30/93	Uranium-233,234	3.97394	pCi/L
02691	11/30/93	Uranium-235	0.242478	pCi/L
02691	11/30/93	Uranium-238	2.43825	pCi/L
3086	10/20/93	Gross alpha	149.145	pCi/L
3086	10/20/93	Gross beta	57.9654	pCi/L
3086	10/20/93	Radium-226	1.2	pCi/L
3086	10/20/93	Uranium-233,234	95.8191	pCi/L
3086	10/20/93	Uranium-235	4.40184	pCi/L
3086	10/20/93	Uranium-238	62.4632	pCi/L
B208189	10/26/93	Gross alpha	13	pCi/L
B208189	10/26/93	Gross beta	3.2	pCi/L
B208189	10/26/93	Radium-226	1	pCi/L
B208189	10/26/93	Uranium-233,234	11	pCi/L
B208189	10/26/93	Uranium-235	0.31	pCi/L
B208189	10/26/93	Uranium-238	7.3	pCi/L
B208689	10/28/93	Gross alpha	110	pCi/L
B208689	10/28/93	Gross beta	32	pCi/L
B208689	10/28/93	Radium-226	0.81	pCi/L
B208689	10/28/93	Uranium-233,234	73	pCi/L

Table 2-5 Activities of Dissolved Radionuclides in UHSU Groundwater at the Solar Evaporation Ponds, 4th Quarter, 1993 (continued)

Well	Date	Analyte	Result <sup>1</sup>	Units
B208689	10/28/93	Uranium-235	1.8	pCi/L
B208689	10/28/93	Uranium-238	46	pCi/L
P207389	10/12/93	Gross alpha	3.1202	pCi/L
P207389	10/12/93	Gross beta	2.89546	pCi/L
P207389	10/12/93	Strontium-89,90	-0.143	pCi/L
P207389	10/12/93	Uranium-233,234	3.70072	pCi/L
P207389	10/12/93	Uranium-235	0.229384	pCi/L
P207389	10/12/93	Uranium-238	2.92082	pCi/L
P208989	10/22/93	Gross alpha	78	pCi/L
P208989	10/22/93	Gross beta	52	pCi/L
P208989	10/22/93	Radium-226	5.4	pCi/L
P208989	10/22/93	Radium-228	7.9	pCi/L
P208989	10/22/93	Strontium-89,90	0.3	pCi/L
P208989	10/22/93	Uranium-233,234	61	pCi/L
P208989	10/22/93	Uranium-235	1.6	pCi/L
P208989	10/22/93	Uranium-238	42	pCi/L
P209389	10/19/93	Gross alpha	2.43499	pCi/L
P209389	10/19/93	Gross beta	1.48691	pCi/L
P209389	10/19/93	Strontium-89,90	0.0968	pCi/L
P209389	10/19/93	Uranium-233,234	0.35976	pCi/L
P209389	10/19/93	Uranium-235	0.0294885	pCi/L
P209389	10/19/93	Uranium-238	0.235908	pCi/L
P209489	10/15/93	Gross alpha	73.6228	pCi/L
P209489	10/15/93	Gross beta	86.904	pCi/L
P209489	10/15/93	Radium-226	0.5	pCi/L
P209489	10/15/93	Strontium-89,90	0.0146	pCi/L
P209489	10/15/93	Uranium-233,234	30.7565	pCi/L
P209489	10/15/93	Uranium-235	2.09269	pCi/L
P209489	10/15/93	Uranium-238	25.7059	pCi/L
P209889	10/21/93	Gross alpha	67	pCi/L
P209889	10/21/93	Gross beta	35	pCi/L
P209889	10/21/93	Radium-226	3.7	pCi/L
P209889	10/21/93	Radium-228	11	pCi/L
P209889	10/21/93	Strontium-89,90	-1.7	pCi/L
P209889	10/21/93	Uranium-233,234	41	pCi/L
P209889	10/21/93	Uranium-235	1.2	pCi/L
P209889	10/21/93	Uranium-238	31	pCi/L
P210089	10/20/93	Gross alpha	11.2789	pCi/L
P210089	10/20/93	Gross beta	5.15681	pCi/L
P210089	10/20/93	Radium-226	0.2	pCi/L
P210089	10/20/93	Uranium-233,234	4.09669	pCi/L
P210089	10/20/93	Uranium-235	0.078508	pCi/L
P210089	10/20/93	Uranium-238	2.77633	pCi/L
P210189	10/22/93	Gross alpha	5.6	pCi/L
P210189	10/22/93	Gross beta	2.5	pCi/L
P210189	10/22/93	Radium-226	0.6	pCi/L
P210189	10/22/93	Strontium-89,90	0	pCi/L

Table 2-5 Activities of Dissolved Radionuclides in UHSU Groundwater at the  
Solar Evaporation Ponds, 4th Quarter, 1993 (continued)

Well	Date	Weathered Bedrock		Units
		Analyte	Result <sup>1</sup>	
P210189	10/22/93	Uranium-233,234	2.3	pCi/L
P210189	10/22/93	Uranium-235	0.088	pCi/L
P210189	10/22/93	Uranium-238	1.4	pCi/L

<sup>1</sup> Results shown in bold-faced type exceed sitewide background value (mean plus two standard deviations) for that analyte.

Table 2-6 Concentrations of VOCs Detected in UHSU Groundwater at the Solar Evaporation Ponds, 4th Quarter, 1993

Well	Date	Surficial Materials		
		Analyte	Result	Units
05093	10/18/93	Benzene	0.2	µg/L
05093	10/18/93	Chloroform	0.6	µg/L
05093	10/18/93	Methylene chloride	1	µg/L
05093	10/18/93	Tetrachloroethene	0.5	µg/L
05093	10/18/93	Toluene	0.3	µg/L
05093	10/18/93	Trichloroethene	1	µg/L
05093	10/18/93	cis-1,2-Dichloroethene	0.5	µg/L
05193	10/18/93	Chloroform	0.3	µg/L
05193	10/18/93	Tetrachloroethene	13	µg/L
05193	10/18/93	Trichloroethene	16	µg/L
05193	10/18/93	cis-1,2-Dichloroethene	0.2	µg/L
1786	10/29/93	Trichloroethene	2	µg/L
2286	10/13/93	Carbon tetrachloride	210	µg/L
2286	10/13/93	Trichloroethene	220	µg/L
2686	10/11/93	Trichloroethene	6	µg/L
3586	12/13/93	1,1,1-Trichloroethane	3	µg/L
3586	12/13/93	1,1-Dichloroethane	37	µg/L
3586	12/13/93	1,2-Dichloroethene	3	µg/L
3586	12/13/93	Vinyl chloride	290	µg/L
5687	10/15/93	1,1-Dichloroethane	10	µg/L
5687	10/15/93	1,1-Dichloroethene	6	µg/L
5687	10/15/93	1,2-Dichloroethene	13	µg/L
5687	10/15/93	Chloroform	5	µg/L
5687	10/15/93	Tetrachloroethene	3	µg/L
5687	10/15/93	Trichloroethene	61	µg/L
P209789	10/15/93	Tetrachloroethene	3	µg/L
P209789	10/15/93	Trichloroethene	4	µg/L
P219189	11/18/93	1,1,1-Trichloroethane	12	µg/L
P219189	11/18/93	1,1-Dichloroethane	58	µg/L
P219189	11/18/93	1,1-Dichloroethene	49	µg/L
P219189	11/18/93	Chloroform	1	µg/L
P219189	11/18/93	cis-1,2-Dichloroethene	1	µg/L
P219489	11/16/93	Tetrachloroethene	0.1	µg/L
P219589	11/15/93	Chloroform	0.1	µg/L
P219589	11/15/93	Tetrachloroethene	0.6	µg/L
P219589	11/15/93	Trichloroethene	0.1	µg/L

Well	Date	Weathered Bedrock		
		Analyte	Result	Unit
02691	11/30/93	Tetrachloroethene	0.2	µg/L
3086	10/20/93	Methylene chloride	8	µg/L
P207789	10/14/93	Methylene chloride	1	µg/L
P208989	10/22/93	Methylene chloride	4	µg/L
P208989	10/22/93	Tetrachloroethene	1	µg/L
P209389	10/19/93	1,1-Dichloroethene	49	µg/L

Table 2-6 Concentrations of VOCs Detected in UHSU Groundwater at the Solar Evaporation Ponds, 4th Quarter, 1993 (continued)

Well	Date	Analyte	Result	Unit
P209389	10/19/93	Carbon tetrachloride	17	µg/L
P209389	10/19/93	Chloroform	9	µg/L
P209489	10/15/93	1,2-Dichloroethene	11	µg/L
P209489	10/15/93	Carbon tetrachloride	46	µg/L
P209489	10/15/93	Chloroform	21	µg/L
P209489	10/15/93	Tetrachloroethene	4	µg/L
P209489	10/15/93	Trichloroethene	70	µg/L
P210089	10/20/93	Methylene chloride	3	µg/L
P210189	10/22/93	1,2-Dichloroethene	100	µg/L
P210189	10/22/93	Carbon tetrachloride	6,600	µg/L
P210189	10/22/93	Chloroform	320	µg/L
P210189	10/22/93	Trichloroethene	3,800	µg/L

Table 2-7 Nitrate/Nitrite Concentrations in UHSU Groundwater at the  
Solar Evaporation Ponds, 4th Quarter, 1993

Well	Date	Surficial Materials		Units
		Analyte	Result <sup>1</sup>	
05093	10/18/93	Nitrate/nitrite	<b>1,806</b>	mg/L
05193	10/18/93	Nitrate/nitrite	<b>383</b>	mg/L
1386	10/28/93	Nitrate/nitrite	.118	mg/L
1586	10/20/93	Nitrate/nitrite	<b>45</b>	mg/L
1786	10/29/93	Nitrate/nitrite	<b>450</b>	mg/L
2187	11/03/93	Nitrate/nitrite	.369	mg/L
2286	10/13/93	Nitrate/nitrite	<b>5.923</b>	mg/L
3586	12/13/93	Nitrate/nitrite	.02	mg/L
B208089	10/26/93	Nitrate/nitrite	.4	mg/L
B210489	10/20/93	Nitrate/nitrite	<b>480</b>	mg/L
P207689	10/18/93	Nitrate/nitrite	<b>68.871</b>	mg/L
P209789	10/15/93	Nitrate/nitrite	<b>95</b>	mg/L
P218389	11/16/93	Nitrate/nitrite	<b>10.312</b>	mg/L
P219189	11/18/93	Nitrate/nitrite	.68	mg/L
P219489	11/16/93	Nitrate/nitrite	<b>41.558</b>	mg/L
P219589	11/15/93	Nitrate/nitrite	<b>100.04</b>	mg/L
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Well	Date	Weathered Bedrock		Units
		Analyte	Result <sup>1</sup>	
02691	11/30/93	Nitrate/nitrite	<b>13</b>	mg/L
3086	10/20/93	Nitrate/nitrite	<b>684.966</b>	mg/L
B208189	10/26/93	Nitrate/nitrite	<b>2</b>	mg/L
B208289	10/27/93	Nitrate/nitrite	<b>65.14</b>	mg/L
B208689	10/28/93	Nitrate/nitrite	.649	mg/L
P207389	10/12/93	Nitrate/nitrite	<b>6.03</b>	mg/L
P207989	10/14/93	Nitrate/nitrite	3.1	mg/L
P208989	10/22/93	Nitrate/nitrite	<b>1,400</b>	mg/L
P209089	10/21/93	Nitrate/nitrite	<b>7.2</b>	mg/L
P209389	10/19/93	Nitrate/nitrite	1.004	mg/L
P209489	10/15/93	Nitrate/nitrite	<b>200</b>	mg/L
P209689	10/12/93	Nitrate/nitrite	<b>41.875</b>	mg/L
P209889	10/21/93	Nitrate/nitrite	<b>2,100</b>	mg/L
P210089	10/20/93	Nitrate/nitrite	<b>200.197</b>	mg/L
P210189	10/22/93	Nitrate/nitrite	<b>17</b>	mg/L

1 Results shown in bold-faced type exceed sitewide background value (mean plus two standard deviations) for that analyte.

Table 2-8 Concentrations of Total Dissolved Solids in UHSU Groundwater at the Solar Evaporation Ponds, 4th Quarter, 1993

Well	Date	Surficial Materials		Units
		Analyte	Result <sup>1</sup>	
05093	10/18/93	Total dissolved solids	<b>11,530</b>	mg/L
05193	10/18/93	Total dissolved solids	<b>3,250</b>	mg/L
1386	10/28/93	Total dissolved solids	751	mg/L
1586	10/20/93	Total dissolved solids	<b>1,100</b>	mg/L
1786	10/29/93	Total dissolved solids	<b>3,900</b>	mg/L
2187	11/03/93	Total dissolved solids	<b>2,018</b>	mg/L
2286	10/13/93	Total dissolved solids	511	mg/L
2686	10/11/93	Total dissolved solids	<b>1,652</b>	mg/L
3586	12/13/93	Total dissolved solids	900	mg/L
5687	10/15/93	Total dissolved solids	<b>1,200</b>	mg/L
B210489	10/20/93	Total dissolved solids	<b>4,700</b>	mg/L
P207689	10/18/93	Total dissolved solids	<b>1,029</b>	mg/L
P209789	10/15/93	Total dissolved solids	<b>1,100</b>	mg/L
P218389	11/16/93	Total dissolved solids	405	mg/L
P219489	11/16/93	Total dissolved solids	509	mg/L
P219589	11/15/93	Total dissolved solids	933	mg/L
Weathered Bedrock				
Well	Date	Analyte	Result <sup>1</sup>	Units
02691	11/30/93	Total dissolved solids	440	mg/L
3086	10/20/93	Total dissolved solids	<b>4,491</b>	mg/L
B208189	10/26/93	Total dissolved solids	560	mg/L
B208689	10/28/93	Total dissolved solids	<b>4,123</b>	mg/L
P207389	10/12/93	Total dissolved solids	483	mg/L
P207989	10/14/93	Total dissolved solids	<b>1,100</b>	mg/L
P208989	10/22/93	Total dissolved solids	<b>11,000</b>	mg/L
P209089	10/21/93	Total dissolved solids	550	mg/L
P209389	10/19/93	Total dissolved solids	547	mg/L
P209489	10/15/93	Total dissolved solids	<b>2,200</b>	mg/L
P209589	10/19/93	Total dissolved solids	<b>31,496</b>	mg/L
P209889	10/21/93	Total dissolved solids	<b>17,000</b>	mg/L
P210089	10/20/93	Total dissolved solids	<b>3,277</b>	mg/L
P210189	10/22/93	Total dissolved solids	550	mg/L

1 Results shown in bold-faced type exceed sitewide background value (mean plus two standard deviations) for that analyte.

Table 2-9 Concentrations of Dissolved Lithium in UHSU Groundwater at the Solar Evaporation Ponds, 4th Quarter, 1993

Well	Date	Surficial Materials		Result <sup>1</sup>	Units
		Analyte			
1386	10/28/93	Lithium		30	µg/L
1586	10/20/93	Lithium		46.6	µg/L
1786	10/29/93	Lithium		<b>408</b>	µg/L
3586	12/13/93	Lithium		15.9	µg/L
B210489	10/20/93	Lithium		<b>333</b>	µg/L
P207689	10/18/93	Lithium		43	µg/L
P209789	10/15/93	Lithium		70.5	µg/L
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Well	Date	Weathered Bedrock		Result <sup>1</sup>	Units
		Analyte			
3086	10/20/93	Lithium		<b>658</b>	µg/L
B208689	10/28/93	Lithium		<b>827</b>	µg/L
P207389	10/12/93	Lithium		30	µg/L
P208989	10/22/93	Lithium		<b>890</b>	µg/L
P209389	10/19/93	Lithium		30	µg/L
P209489	10/15/93	Lithium		<b>152</b>	µg/L
P209889	10/21/93	Lithium		<b>2,700</b>	µg/L
P210189	10/22/93	Lithium		27	µg/L

1 Results shown in bold-faced type exceed sitewide background value (mean plus two standard deviations) for that analyte.

Table 3-1 Infrequently Detected Analytes (less than 50% Quantifiable Results).  
Concentrations in Downgradient UHSU Groundwater at the West Spray Field

VOCs in Downgradient UHSU Groundwater			
Well	Date	Analyte	Result
B410789	07/26/93	Acetone	7 µg/L
5086	04/14/93	Methylene chloride	1 µg/L
B410689	04/12/93	Methylene chloride	2 µg/L

  

Dissolved Metals in Downgradient UHSU Groundwater			
Well	Date	Analyte	Result
5086	08/03/93	Aluminum	18.20 µg/L
B110889	07/23/93	Aluminum	358 µg/L
B111189	07/23/93	Aluminum	122 µg/L
B410689	07/22/93	Aluminum	50.8 µg/L
B410689	04/12/93	Cadmium	2.2 µg/L
B110889	07/23/93	Cesium	120 µg/L
B111189	07/23/93	Cesium	110 µg/L
B410689	07/22/93	Cesium	120 µg/L
5086	08/03/93	Copper	3.80 µg/L
B110889	01/25/93	Copper	7.2 µg/L
B111189	01/26/93	Copper	5 µg/L
B410789	01/26/93	Copper	13.4 µg/L
5086	02/03/93	Iron	120 µg/L
B110889	07/23/93	Iron	294 µg/L
B111189	07/23/93	Iron	64.7 µg/L
B410689	04/12/93	Iron	15.7 µg/L
B410689	07/22/93	Iron	32.7 µg/L
B410689	01/25/93	Lead	1.6 µg/L
5086	08/03/93	Manganese	2.30 µg/L
B110889	04/09/93	Manganese	1.2 µg/L
B110889	07/23/93	Manganese	5 µg/L
B110989	04/15/93	Manganese	1.2 µg/L
B111189	07/23/93	Manganese	1 µg/L
B410689	07/22/93	Manganese	1.9 µg/L
B410689	07/22/93	Molybdenum	6.7 µg/L
B111189	04/13/93	Selenium	1.8 µg/L
B410689	07/22/93	Tin	20.3 µg/L
5086	08/03/93	Vanadium	27.00 µg/L
B110889	04/09/93	Vanadium	2.4 µg/L
B110889	07/23/93	Vanadium	23 µg/L
B410589	04/08/93	Vanadium	2.2 µg/L
B410689	07/22/93	Vanadium	16.9 µg/L
5086	08/03/93	Zinc	5.00 µg/L
B110889	07/23/93	Zinc	6.2 µg/L
B110989	07/19/93	Zinc	8.7 µg/L
B110989	11/08/93	Zinc	11.3 µg/L
B111189	01/26/93	Zinc	6.6 µg/L
B111189	07/23/93	Zinc	5.2 µg/L
B410689	01/25/93	Zinc	3.4 µg/L
B410789	01/26/93	Zinc	4.5 µg/L

Table 3-1 Infrequently Detected Analytes (less than 50% Quantifiable Results) (continued).  
 Concentrations in Downgradient UHSU Groundwater at the West Spray Field

Other Inorganic Parameters in Downgradient UHSU Groundwater			
Well	Date	Analyte	Result
B110989	01/25/93	Cyanide	13.000 µg/L
B410689	01/25/93	Cyanide	49.000 µg/L
B410789 5086	01/26/93 04/14/93	Cyanide Orthophosphate	37.000 µg/L 10.00 µg/L
5086	08/03/93	Orthophosphate	10.00 µg/L
B110889	04/09/93	Orthophosphate	10.00 µg/L
B110989	04/15/93	Orthophosphate	10.00 µg/L
B111189	04/13/93	Orthophosphate	10.00 µg/L
B111189	07/23/93	Orthophosphate	10.00 µg/L
B111189	11/04/93	Orthophosphate	10.00 µg/L
B410589	01/27/93	Orthophosphate	10.00 µg/L
B410589	04/08/93	Orthophosphate	20.00

Table 3-2 Comparative Statistics for the West Spray Field -  
UHSU and UHSU Surficial Deposits

Analyte	ANOVA Method <sup>1</sup>	Probability Value	Well Comparison
Dissolved			
Barium	Normal	0.0001	*
Calcium	Lognormal	0.0001	*
Gross Alpha	Nonparametric	0.0138	*
Gross Beta	Nonparametric	0.0992	**
Lithium	Nonparametric	0.1928	**
Magnesium	Lognormal	0.0001	*
Potassium	Nonparametric	0.0240	#
Silicon	Lognormal	0.0002	*
Sodium	Nonparametric	0.0002	*
Strontium	Normal	0.0001	*
Strontium-89,90	Nonparametric	0.6358	**
Total Radiocesium	Normal	0.7541	**
Uranium-233,234	Nonparametric	0.1761	**
Uranium-235	Normal	0.5569	**
Uranium-238	Nonparametric	0.5889	**
Total			
Americium-241	Normal	0.3644	**
Bicarbonate as CaCO <sub>3</sub>	Nonparametric	0.0006	*
Chloride	Nonparametric	0.0002	*
Fluoride	Normal	0.0001	*
Nitrate/Nitrite	Nonparametric	0.0132	#
Plutonium-239,240	Nonparametric	0.5134	**
Sulfate	Lognormal	0.0001	*
Total Dissolved Solids	Lognormal	0.1445	**
Total Suspended Solids	Nonparametric	0.1714	**
Tritium	Normal	0.1641	**

Table 3-2 Comparative Statistics for the West Spray Field -  
UHSU and UHSU Surficial Deposits (continued)

I Normal = Data were normally distributed and analyzed using parametric ANOVA methods.  
Lognormal = Data were transformed using natural logarithms prior to parametric ANOVA analysis.  
Nonparametric = Data were analyzed using distribution-free nonparametric ANOVA methods.

- # Identifies a statistically significant difference between some locations. However, no statistical difference exists between the mean upgradient concentration and the concentration in compliance wells.
- Indicates that the analyte concentrations in the downgradient wells are statistically greater than the mean upgradient concentration.
- \*\* Indicates that no statistical difference exists between upgradient and downgradient analyte concentrations at the 0.05 significance level.

**Table 3-3. Activities of Total Radionuclides in UHSU Groundwater at the  
West Spray Field, 4th Quarter, 1993**

Well	Date	Surficial Materials		Result <sup>1</sup>	Units
		Analyte			
0190	11/19/93	Tritium		39	pCi/L
0390	11/19/93	Tritium		30	pCi/L
1490	11/21/93	Tritium		72	pCi/L
46192	11/04/93	Americium-241		0	pCi/L
46192	11/04/93	Plutonium-239,240		.0012696	pCi/L
46192	11/04/93	Tritium		-28.26	pCi/L
46292	11/11/93	Americium-241		.00880393	pCi/L
46292	11/11/93	Plutonium-239,240		.00460544	pCi/L
46292	11/11/93	Tritium		-13.58	pCi/L
46492	12/13/93	Americium-241		-0.002	pCi/L
46492	12/13/93	Plutonium-239,240		0.005	pCi/L
46492	12/13/93	Tritium		47	pCi/L
4786	12/02/93	Americium-241		.00552142	pCi/L
4786	12/02/93	Plutonium-239,240		.0168001	pCi/L
4786	12/02/93	Tritium		61.17	pCi/L
4986	11/09/93	Americium-241		.00332155	pCi/L
4986	11/09/93	Plutonium-239,240		.00157108	pCi/L
4986	11/09/93	Tritium		136.44	pCi/L
5086	11/05/93	Americium-241		0.002	pCi/L
5086	11/05/93	Plutonium-239,240		-0.001	pCi/L
5086	11/05/93	Tritium		180	pCi/L
5186	11/05/93	Americium-241		0.004	pCi/L
5186	11/05/93	Plutonium-239,240		0	pCi/L
5186	11/05/93	Tritium		16	pCi/L
5686	12/10/93	Americium-241		.00386286	pCi/L
5686	12/10/93	Plutonium-239,240		.00319427	pCi/L
5686	12/10/93	Tritium		120.1	pCi/L
B110889	11/05/93	Americium-241		0.001	pCi/L
B110889	11/05/93	Plutonium-239,240		0.001	pCi/L
B110889	11/05/93	Tritium		190	pCi/L
B110989	11/08/93	Americium-241		.0026975	pCi/L
B110989	11/08/93	Plutonium-239,240		0	pCi/L
B110989	11/08/93	Tritium		43.69	pCi/L
B111189	11/04/93	Americium-241		0.001	pCi/L
B111189	11/04/93	Plutonium-239,240		0.010	pCi/L
B111189	11/04/93	Tritium		30	pCi/L
B410689	11/02/93	Americium-241		.00312038	pCi/L
B410689	11/02/93	Plutonium-239,240		.00240437	pCi/L
B410689	11/02/93	Tritium		218.83	pCi/L
B410789	11/05/93	Americium-241		0.005	pCi/L
B410789	11/05/93	Plutonium-239,240		0	pCi/L
B410789	11/05/93	Tritium		150	pCi/L
B411289	11/04/93	Americium-241		0.007	pCi/L
B411289	11/04/93	Plutonium-239,240		0.003	pCi/L
B411289	11/04/93	Tritium		-74	pCi/L

Table 3-3 Activities of Total Radionuclides in UHSU Groundwater at the West Spray Field, 4th Quarter, 1993 (continued)

Well	Date	Surficial Materials		Units
		Analyte	Result <sup>1</sup>	
B411389	11/03/93	Americium-241	.00094587	pCi/L
B411389	11/03/93	Plutonium-239,240	.00121777	pCi/L
B411389	11/03/93	Tritium	104.87	pCi/L
P114389	11/18/93	Tritium	110	pCi/L
P114989	11/23/93	Tritium	11	pCi/L
P115089	11/21/93	Americium-241	0.003	pCi/L
P115089	11/21/93	Plutonium-239,240	0.001	pCi/L
P115089	11/21/93	Tritium	-5.6	pCi/L
P415889	11/18/93	Americium-241	0.024	pCi/L
P415889	11/18/93	Plutonium-239,240	0	pCi/L
P415889	11/18/93	Tritium	150	pCi/L
P415989	11/21/93	Americium-241	0.006	pCi/L
P415989	11/21/93	Plutonium-239,240	-0.004	pCi/L
P415989	11/21/93	Tritium	220	pCi/L
P416089	11/23/93	Americium-241	0.0044	pCi/L
P416089	11/23/93	Plutonium-239,240	0.0019	pCi/L
P416089	11/23/93	Tritium	130	pCi/L
P416189	11/21/93	Americium-241	0.0094	pCi/L
P416189	11/21/93	Plutonium-239,240	0	pCi/L
P416189	11/21/93	Tritium	200	pCi/L
P416289	11/22/93	Tritium	87	pCi/L
P416389	11/23/93	Americium-241	0.0020	pCi/L
P416389	11/23/93	Plutonium-239,240	0.0030	pCi/L
P416389	11/23/93	Tritium	140	pCi/L
P416489	11/22/93	Tritium	160	pCi/L
P416589	11/21/93	Americium-241	0.0073	pCi/L
P416589	11/21/93	Plutonium-239,240	0.0015	pCi/L
P416589	11/21/93	Tritium	380	pCi/L
Weathered Bedrock				
Well	Date	Analyte	Result <sup>1</sup>	Units
46392	11/09/93	Americium-241	.00898015	pCi/L
46392	11/09/93	Plutonium-239,240	.00268623	pCi/L
46392	11/09/93	Tritium	32.46	pCi/L
P416989	11/23/93	Americium-241	0.0041	pCi/L
P416989	11/23/93	Plutonium-239,240	0.0039	pCi/L
P416989	11/23/93	Tritium	-39	pCi/L

1 Results shown in bold-faced type exceed sitewide background value (mean plus two standard deviations) for that analyte.

Table 3-4 Activities of Dissolved Radionuclides in UHSU Groundwater at the West Spray Field, 4th Quarter, 1993

Well	Date	Surficial Materials		Units
		Analyte	Result <sup>1</sup>	
0190	11/19/93	Gross alpha	0.48	pCi/L
0190	11/19/93	Gross beta	1.3	pCi/L
0190	11/19/93	Radium-226	0.23	pCi/L
0190	11/19/93	Radium-228	0.18	pCi/L
0190	11/19/93	Strontium-89,90	-0.079	pCi/L
0190	11/19/93	Uranium-233,234	0.0075	pCi/L
0190	11/19/93	Uranium-235	0.038	pCi/L
0190	11/19/93	Uranium-238	0.11	pCi/L
0390	11/19/93	Gross alpha	0.79	pCi/L
0390	11/19/93	Gross beta	1.5	pCi/L
0390	11/19/93	Radium-226	0.15	pCi/L
0390	11/19/93	Radium-228	0.079	pCi/L
0390	11/19/93	Strontium-89,90	0.020	pCi/L
0390	11/19/93	Uranium-233,234	0.52	pCi/L
0390	11/19/93	Uranium-235	0.072	pCi/L
0390	11/19/93	Uranium-238	0.35	pCi/L
1490	11/21/93	Gross alpha	0.23	pCi/L
1490	11/21/93	Gross beta	1.0	pCi/L
1490	11/21/93	Radium-226	0.010	pCi/L
1490	11/21/93	Radium-228	12	pCi/L
1490	11/21/93	Strontium-89,90	-0.11	pCi/L
1490	11/21/93	Uranium-233,234	0.62	pCi/L
1490	11/21/93	Uranium-235	0	pCi/L
1490	11/21/93	Uranium-238	0.47	pCi/L
46192	11/04/93	Gross alpha	1.01922	pCi/L
46192	11/04/93	Gross beta	2.18518	pCi/L
46192	11/04/93	Strontium-89,90	-0.0104	pCi/L
46192	11/04/93	Uranium-233,234	.168263	pCi/L
46192	11/04/93	Uranium-235	.0685516	pCi/L
46192	11/04/93	Uranium-238	.28667	pCi/L
46292	11/11/93	Gross alpha	.441308	pCi/L
46292	11/11/93	Gross beta	.839601	pCi/L
46292	11/11/93	Strontium-89,90	.105299	pCi/L
46292	11/11/93	Uranium-233,234	.524264	pCi/L
46292	11/11/93	Uranium-235	.0729988	pCi/L
46292	11/11/93	Uranium-238	.192451	pCi/L
46492	12/13/93	Gross alpha	0.76	pCi/L
46492	12/13/93	Gross beta	1.2	pCi/L
46492	12/13/93	Strontium-89,90	0.24	pCi/L
46492	12/13/93	Uranium-233,234	1.2	pCi/L
46492	12/13/93	Uranium-235	-0.005	pCi/L
46492	12/13/93	Uranium-238	0.56	pCi/L
4786	12/02/93	Gross alpha	-.126926	pCi/L
4786	12/02/93	Gross beta	2.59913	pCi/L
4786	12/02/93	Strontium-89,90	-.043	pCi/L

Table 3-4 Activities of Dissolved Radionuclides in UHSU Groundwater at the West Spray Field, 4th Quarter, 1993 (continued)

Well	Date	Analyte	Result <sup>1</sup>	Units
4786	12/02/93	Uranium-233,234	.817933	pCi/L
4786	12/02/93	Uranium-235	.0817933	pCi/L
4786	12/02/93	Uranium-238	.550246	pCi/L
4986	11/09/93	Gross alpha	.744393	pCi/L
4986	11/09/93	Gross beta	1.16668	pCi/L
4986	11/09/93	Strontium-89,90	.138103	pCi/L
4986	11/09/93	Uranium-233,234	.279395	pCi/L
4986	11/09/93	Uranium-235	.0501478	pCi/L
4986	11/09/93	Uranium-238	.401182	pCi/L
5086	11/05/93	Gross alpha	0.42	pCi/L
5086	11/05/93	Gross beta	1.0	pCi/L
5086	11/05/93	Strontium-89,90	0.090	pCi/L
5086	11/05/93	Uranium-233,234	0.90	pCi/L
5086	11/05/93	Uranium-235	-0.006	pCi/L
5086	11/05/93	Uranium-238	0.72	pCi/L
5186	11/05/93	Gross alpha	0.24	pCi/L
5186	11/05/93	Gross beta	0.77	pCi/L
5186	11/05/93	Strontium-89,90	0.060	pCi/L
5186	11/05/93	Uranium-233,234	1.3	pCi/L
5186	11/05/93	Uranium-235	0.046	pCi/L
5186	11/05/93	Uranium-238	1.8	pCi/L
5686	12/10/93	Gross alpha	.6934568	pCi/L
5686	12/10/93	Gross beta	1.50726713	pCi/L
5686	12/10/93	Strontium-89,90	.532	pCi/L
5686	12/10/93	Uranium-233,234	.25801536	pCi/L
5686	12/10/93	Uranium-235	0	pCi/L
5686	12/10/93	Uranium-238	.13844727	pCi/L
B110889	11/05/93	Gross alpha	2.0	pCi/L
B110889	11/05/93	Gross beta	1.1	pCi/L
B110889	11/05/93	Strontium-89,90	0.050	pCi/L
B110889	11/05/93	Uranium-233,234	0.39	pCi/L
B110889	11/05/93	Uranium-235	0.055	pCi/L
B110889	11/05/93	Uranium-238	1.0	pCi/L
B110989	11/08/93	Gross alpha	.937883	pCi/L
B110989	11/08/93	Gross beta	2.19515	pCi/L
B110989	11/08/93	Strontium-89,90	.232598	pCi/L
B110989	11/08/93	Uranium-233,234	.567855	pCi/L
B110989	11/08/93	Uranium-235	.0718804	pCi/L
B110989	11/08/93	Uranium-238	.488787	pCi/L
B111189	11/04/93	Gross alpha	0.82	pCi/L
B111189	11/04/93	Gross beta	0.47	pCi/L
B111189	11/04/93	Strontium-89,90	-0.070	pCi/L
B111189	11/04/93	Uranium-233,234	0.56	pCi/L
B111189	11/04/93	Uranium-235	0.093	pCi/L
B111189	11/04/93	Uranium-238	0.42	pCi/L
B410689	11/02/93	Gross alpha	.088274	pCi/L
B410689	11/02/93	Gross beta	1.26119	pCi/L

Table 3-4 Activities of Dissolved Radionuclides in UHSU Groundwater at the West Spray Field, 4th Quarter, 1993 (continued)

Well	Date	Surficial Materials		Units
		Analyte	Result <sup>1</sup>	
B410689	11/02/93	Strontium-89,90	-163	pCi/L
B410689	11/02/93	Uranium-233,234	.451016	pCi/L
B410689	11/02/93	Uranium-235	.077317	pCi/L
B410689	11/02/93	Uranium-238	.373699	pCi/L
B410789	11/05/93	Gross alpha	2.1	pCi/L
B410789	11/05/93	Gross beta	3.2	pCi/L
B410789	11/05/93	Strontium-89,90	-0.040	pCi/L
B410789	11/05/93	Uranium-233,234	1.2	pCi/L
B410789	11/05/93	Uranium-235	-0.019	pCi/L
B410789	11/05/93	Uranium-238	1.3	pCi/L
B411289	11/04/93	Gross alpha	0.61	pCi/L
B411289	11/04/93	Gross beta	1.3	pCi/L
B411289	11/04/93	Strontium-89,90	0.040	pCi/L
B411289	11/04/93	Uranium-233,234	2.0	pCi/L
B411289	11/04/93	Uranium-235	0.061	pCi/L
B411289	11/04/93	Uranium-238	1.2	pCi/L
B411389	11/03/93	Gross alpha	.28	pCi/L
B411389	11/03/93	Gross beta	1.8	pCi/L
B411389	11/03/93	Strontium-89,90	-0.0849	pCi/L
B411389	11/03/93	Uranium-233,234	.191304	pCi/L
B411389	11/03/93	Uranium-235	0	pCi/L
B411389	11/03/93	Uranium-238	.143478	pCi/L
P114389	11/18/93	Gross alpha	6.6	pCi/L
P114389	11/18/93	Gross beta	5.7	pCi/L
P114389	11/18/93	Radium-226	0.32	pCi/L
P114389	11/18/93	Strontium-89,90	-0.0036	pCi/L
P114389	11/18/93	Uranium-233,234	9.1	pCi/L
P114389	11/18/93	Uranium-235	0.60	pCi/L
P114389	11/18/93	Uranium-238	6.3	pCi/L
P114489	11/18/93	Gross alpha	-0.18	pCi/L
P114489	11/18/93	Gross beta	1.2	pCi/L
P114489	11/18/93	Strontium-89,90	-0.13	pCi/L
P114489	11/18/93	Uranium-233,234	0.65	pCi/L
P114489	11/18/93	Uranium-235	0.14	pCi/L
P114489	11/18/93	Uranium-238	1.4	pCi/L
P114989	11/23/93	Gross alpha	1.2	pCi/L
P114989	11/23/93	Gross beta	1.3	pCi/L
P114989	11/23/93	Strontium-89,90	-0.19	pCi/L
P114989	11/23/93	Uranium-233,234	1.6	pCi/L
P114989	11/23/93	Uranium-235	0.10	pCi/L
P114989	11/23/93	Uranium-238	0.45	pCi/L
P115089	11/21/93	Gross alpha	0.76	pCi/L
P115089	11/21/93	Gross beta	-0.45	pCi/L
P115089	11/21/93	Strontium-89,90	-0.16	pCi/L
P115089	11/21/93	Uranium-233,234	0.95	pCi/L
P115089	11/21/93	Uranium-235	0	pCi/L
P115089	11/21/93	Uranium-238	0.38	pCi/L

Table 3-4 Activities of Dissolved Radionuclides in UHSU Groundwater at the West Spray Field, 4th Quarter, 1993 (continued)

Well	Date	Surficial Materials		Units
		Analyte	Result <sup>1</sup>	
P415889	11/18/93	Gross alpha	0.75	pCi/L
P415889	11/18/93	Gross beta	1.4	pCi/L
P415889	11/18/93	Strontium-89,90	-0.14	pCi/L
P415889	11/18/93	Uranium-233,234	0.35	pCi/L
P415889	11/18/93	Uranium-235	0.042	pCi/L
P415889	11/18/93	Uranium-238	0.20	pCi/L
P415989	11/21/93	Gross alpha	0.88	pCi/L
P415989	11/21/93	Gross beta	1.0	pCi/L
P415989	11/21/93	Strontium-89,90	-0.090	pCi/L
P415989	11/21/93	Uranium-233,234	0.69	pCi/L
P415989	11/21/93	Uranium-235	0.031	pCi/L
P415989	11/21/93	Uranium-238	0.69	pCi/L
P416089	11/23/93	Gross alpha	-0.54	pCi/L
P416089	11/23/93	Gross beta	0.65	pCi/L
P416089	11/23/93	Strontium-89,90	0.046	pCi/L
P416089	11/23/93	Uranium-233,234	0.35	pCi/L
P416089	11/23/93	Uranium-235	0.17	pCi/L
P416089	11/23/93	Uranium-238	0.13	pCi/L
P416189	11/21/93	Gross alpha	1.00	pCi/L
P416189	11/21/93	Gross beta	0.19	pCi/L
P416189	11/21/93	Strontium-89,90	-0.091	pCi/L
P416189	11/21/93	Uranium-233,234	0.78	pCi/L
P416189	11/21/93	Uranium-235	0.039	pCi/L
P416189	11/21/93	Uranium-238	0.26	pCi/L
P416389	11/23/93	Gross alpha	0.58	pCi/L
P416389	11/23/93	Gross beta	2.2	pCi/L
P416389	11/23/93	Strontium-89,90	0.027	pCi/L
P416389	11/23/93	Uranium-233,234	0.50	pCi/L
P416389	11/23/93	Uranium-235	0.11	pCi/L
P416389	11/23/93	Uranium-238	0.22	pCi/L
P416489	11/22/93	Gross alpha	1.1	pCi/L
P416489	11/22/93	Gross beta	1.2	pCi/L
P416489	11/22/93	Strontium-89,90	-0.14	pCi/L
P416489	11/22/93	Uranium-233,234	2.0	pCi/L
P416489	11/22/93	Uranium-235	0.084	pCi/L
P416489	11/22/93	Uranium-238	1.4	pCi/L
P416589	11/21/93	Gross alpha	1.8	pCi/L
P416589	11/21/93	Gross beta	2.3	pCi/L
P416589	11/21/93	Strontium-89,90	0.046	pCi/L
P416589	11/21/93	Uranium-233,234	0.88	pCi/L
P416589	11/21/93	Uranium-235	0.12	pCi/L
P416589	11/21/93	Uranium-238	0.33	pCi/L

Table 3-4 Activities of Dissolved Radionuclides in UHSU Groundwater at the  
West Spray Field, 4th Quarter, 1993 (continued)

Well	Date	Weathered Bedrock		Units
		Analyte	Result <sup>1</sup>	
46392	11/09/93	Gross alpha	1.5249	pCi/L
46392	11/09/93	Gross beta	2.10187	pCi/L
46392	11/09/93	Strontium-89,90	.022532	pCi/L
46392	11/09/93	Uranium-233,234	1.97695	pCi/L
46392	11/09/93	Uranium-235	.148271	pCi/L
46392	11/09/93	Uranium-238	1.16146	pCi/L
P416989	11/23/93	Gross alpha	1.2	pCi/L
P416989	11/23/93	Gross beta	3.3	pCi/L
P416989	11/23/93	Strontium-89,90	-0.072	pCi/L
P416989	11/23/93	Uranium-233,234	26	pCi/L
P416989	11/23/93	Uranium-235	1.3	pCi/L
P416989	11/23/93	Uranium-238	29	pCi/L

1 Results shown in bold-faced type exceed sitewide background value (mean plus two standard deviations) for that analyte.

Table 3-5 Concentrations of VOCs Detected in UHSU Groundwater at the  
West Spray Field, 4th Quarter, 1993

Surficial Materials				
Well	Date	Analyte	Result	Units
1490	11/21/93	1,2,3-Trichlorobenzene	0.5	µg/L
5686	12/10/93	Methylene chloride	3	µg/L

  

Weathered Bedrock				
Well	Date	Analyte	Result	Units
46392	11/09/93	Chloroform	0.9	µg/L

Table 3-6 Concentrations of Nitrate/Nitrite Detected in UHSU Groundwater at the West Spray Field, 4th Quarter, 1993

Well	Date	Surficial Materials		Result <sup>1</sup>	Units
		Analyte			
0190	11/19/93	Nitrate/nitrite		1.5	mg/L
0390	11/19/93	Nitrate/nitrite		.8	mg/L
1490	11/21/93	Nitrate/nitrite		.723	mg/L
46192	11/04/93	Nitrate/nitrite		.4	mg/L
46292	11/11/93	Nitrate/nitrite		.7	mg/L
46492	12/13/93	Nitrate/nitrite		.9	mg/L
4786	12/02/93	Nitrate/nitrite		.8	mg/L
4986	11/09/93	Nitrate/nitrite		3.776	mg/L
5086	11/05/93	Nitrate/nitrite		.8	mg/L
5186	11/05/93	Nitrate/nitrite		3.3	mg/L
5686	12/10/93	Nitrate/nitrite		.13	mg/L
B110889	11/05/93	Nitrate/nitrite		1.2	mg/L
B110989	11/08/93	Nitrate/nitrite		1.028	mg/L
B111189	11/04/93	Nitrate/nitrite		.5	mg/L
B410689	11/02/93	Nitrate/nitrite		1.78	mg/L
B410789	11/05/93	Nitrate/nitrite		3.0	mg/L
B411289	11/04/93	Nitrate/nitrite		.2	mg/L
B411389	11/03/93	Nitrate/nitrite		.6	mg/L
P114389	11/18/93	Nitrate/nitrite		.031	mg/L
P114489	11/18/93	Nitrate/nitrite		2.669	mg/L
P114989	11/23/93	Nitrate/nitrite		.3	mg/L
P115089	11/21/93	Nitrate/nitrite		2.958	mg/L
P415889	11/18/93	Nitrate/nitrite		2.656	mg/L
P415989	11/21/93	Nitrate/nitrite		2.048	mg/L
P416089	11/23/93	Nitrate/nitrite		2.3	mg/L
P416189	11/21/93	Nitrate/nitrite		3.208	mg/L
P416289	11/22/93	Nitrate/nitrite		3.056	mg/L
P416389	11/23/93	Nitrate/nitrite		4.118	mg/L
P416489	11/22/93	Nitrate/nitrite		.501	mg/L
P416589	11/21/93	Nitrate/nitrite		2.739	mg/L
Weathered Bedrock					
Well	Date	Analyte		Result <sup>1</sup>	Units
46392	11/09/93	Nitrate/nitrite		.267	mg/L
P416989	11/23/93	Nitrate/nitrite		.018	mg/L

1 Results shown in bold-faced type exceed sitewide background value (mean plus two standard deviations) for that analyte.

Table 3-7 Concentrations of Total Dissolved Solids in UHSU Groundwater at the West Spray Field, 4th Quarter, 1993

Well	Date	Surficial Materials		Units
		Analyte	Result <sup>1</sup>	
0190	11/19/93	Total dissolved solids	380	mg/L
0390	11/19/93	Total dissolved solids	340	mg/L
1490	11/21/93	Total dissolved solids	154	mg/L
46192	11/04/93	Total dissolved solids	230	mg/L
46292	11/11/93	Total dissolved solids	260	mg/L
46492	12/13/93	Total dissolved solids	170	mg/L
4786	12/02/93	Total dissolved solids	200	mg/L
4986	11/09/93	Total dissolved solids	164	mg/L
5086	11/05/93	Total dissolved solids	170	mg/L
5186	11/05/93	Total dissolved solids	190	mg/L
5686	12/10/93	Total dissolved solids	160	mg/L
B110889	11/05/93	Total dissolved solids	200	mg/L
B110989	11/08/93	Total dissolved solids	167	mg/L
B111189	11/04/93	Total dissolved solids	340	mg/L
B410689	11/02/93	Total dissolved solids	125	mg/L
B410789	11/05/93	Total dissolved solids	250	mg/L
B411289	11/04/93	Total dissolved solids	120	mg/L
B411389	11/03/93	Total dissolved solids	160	mg/L
P114389	11/18/93	Total dissolved solids	711	mg/L
P114489	11/18/93	Total dissolved solids	193	mg/L
P114589	11/17/93	Total dissolved solids	233	mg/L
P114989	11/23/93	Total dissolved solids	600	mg/L
P115089	11/21/93	Total dissolved solids	236	mg/L
P415889	11/18/93	Total dissolved solids	263	mg/L
P415989	11/21/93	Total dissolved solids	317	mg/L
P416089	11/23/93	Total dissolved solids	280	mg/L
P416189	11/21/93	Total dissolved solids	363	mg/L
P416289	11/22/93	Total dissolved solids	425	mg/L
P416389	11/23/93	Total dissolved solids	273	mg/L
P416489	11/22/93	Total dissolved solids	423	mg/L
P416589	11/21/93	Total dissolved solids	281	mg/L
Weathered Bedrock				
Well	Date	Analyte	Result <sup>1</sup>	Units
46392	11/09/93	Total dissolved solids	162	mg/L
P416989	11/23/93	Total dissolved solids	233	mg/L

1 Results shown in bold-faced type exceed sitewide background value (mean plus two standard deviations) for that analyte.

Table 3-8 Concentrations of Chloride Detected in UHSU Groundwater at the West Spray Field, 4th Quarter, 1993

Well	Date	Surficial Materials		Result <sup>1</sup>	Units
		Analyte			
0190	11/19/93	Chloride		8	mg/L
0390	11/19/93	Chloride		4	mg/L
1490	11/21/93	Chloride		3.072	mg/L
46192	11/04/93	Chloride		2.5	mg/L
46292	11/11/93	Chloride		3	mg/L
46492	12/13/93	Chloride		5	mg/L
4786	12/02/93	Chloride		3	mg/L
4986	11/09/93	Chloride		8.755	mg/L
5086	11/05/93	Chloride		12	mg/L
5186	11/05/93	Chloride		4.9	mg/L
5686	12/10/93	Chloride		22	mg/L
B110889	11/05/93	Chloride		9.5	mg/L
B110989	11/08/93	Chloride		6.985	mg/L
B111189	11/04/93	Chloride		5.2	mg/L
B410689	11/02/93	Chloride		9.351	mg/L
B410789	11/05/93	Chloride		26	mg/L
B411289	11/04/93	Chloride		3	mg/L
B411389	11/03/93	Chloride		4	mg/L
P114389	11/18/93	Chloride		25.17	mg/L
P114489	11/18/93	Chloride		19.38	mg/L
P114589	11/17/93	Chloride		9.185	mg/L
P114989	11/23/93	Chloride		3	mg/L
P115089	11/21/93	Chloride		32.87	mg/L
P415889	11/18/93	Chloride		45.22	mg/L
P415989	11/21/93	Chloride		11.17	mg/L
P416089	11/23/93	Chloride		60	mg/L
P416189	11/21/93	Chloride		61.23	mg/L
P416289	11/22/93	Chloride		37.57	mg/L
P416389	11/23/93	Chloride		30.26	mg/L
P416489	11/22/93	Chloride		42.54	mg/L
P416589	11/21/93	Chloride		21.65	mg/L
Weathered Bedrock					
Well	Date	Analyte		Result <sup>1</sup>	Units
46392	11/09/93	Chloride		2.276	mg/L
P416989	11/23/93	Chloride		39.78	mg/L

1 Results shown in bold-faced type exceed sitewide background value (mean plus two standard deviations) for that analyte.

Table 4-1 Infrequently Detected Analytes (less than 50% Quantifiable Results).  
 Concentrations in Downgradient UHSU Groundwater at the Present Landfill

VOCs in Downgradient UHSU Groundwater			
Well	Date	Analyte	Result
B207089	08/13/93	Methylene chloride	2 µg/L
Dissolved Metals in Downgradient UHSU Groundwater			
Well	Date	Analyte	Result
B207089	10/12/93	Arsenic	4 µg/L
B207089	03/02/93	Copper	7.4 µg/L
B207089	03/02/93	Lead	1.3 µg/L
B207089	10/12/93	Tin	36.6 µg/L
Inorganic Parameters in Downgradient UHSU Groundwater			
Well	Date	Analyte	Result
B207089	03/02/93	Ammonia	180.00 µg/L
B207089	04/20/93	Ammonia	90.00 µg/L
B207089	10/12/93	Ammonia	132.000 µg/L
B207089	10/12/93	Carbonate	1000 µg/L
B207089	08/13/93	Chemical oxygen demand	10000 µg/L
B207089	10/12/93	Chemical oxygen demand	9340.00 µg/L
B207089	10/12/93	Cyanide	5.6000 µg/L
B207089	08/13/93	Orthophosphate	10.00 µg/L
B207089	10/12/93	Orthophosphate	6.000 µg/L

Table 4-2 Comparative Statistics for the Present Landfill - UHSU

Analyte	ANOVA Method <sup>1</sup>	Probability Value	Well Comparison
<b>Dissolved</b>			
Barium	Nonparametric	0.0059	#
Calcium	Lognormal	0.0001	* Pool - B207089
Lithium	Nonparametric	0.0236	* Pool - B207089
Magnesium	Nonparametric	0.0031	• Pool - B207089
Manganese	Nonparametric	0.0037	#
Potassium	Nonparametric	0.0079	* Pool - B207089
Silicon	Nonparametric	0.0307	#
Sodium	Nonparametric	0.0052	* Pool - B207089
Strontium	Nonparametric	0.0030	* Pool - B207089
Strontium-89,90	Normal	0.9916	**
Uranium-233,234	Normal	0.0002	#
Uranium-235	Nonparametric	0.3095	**
Uranium-238	Normal	0.0001	#
<b>Totals</b>			
Americium-241	Nonparametric	0.2627	**
Bicarbonate as CaCO <sub>3</sub>	Nonparametric	0.0045	* Pool - B207089
Chloride	Nonparametric	0.0015	* Pool - B207089
Fluoride	Nonparametric	0.0016	#
Nitrate/Nitrite	Nonparametric	0.0578	**
Plutonium-239, 240	Nonparametric	0.2956	**
Sulfate	Nonparametric	0.0015	* Pool - B207089
Total Dissolved Solids	Nonparametric	0.0181	* Pool - B207089
Total Organic Carbon	Nonparametric	0.8457	**
Total Suspended Solids	Nonparametric	0.0021	#
Tritium	Nonparametric	0.6189	**

1. Normal = Data were normally distributed and analyzed using parametric ANOVA methods.

Lognormal = Data were transformed using natural logarithms prior to parametric ANOVA analysis.

Nonparametric = Data were analyzed using distribution-free nonparametric ANOVA methods.

# Identifies a statistically significant difference between some locations. However, no statistical difference exists between the mean upgradient concentration and the concentration in compliance wells.

• Indicates that the analyte concentrations in the downgradient wells are statistically greater than the mean upgradient concentration.

\*\* Indicates that no statistical difference exists between upgradient and downgradient analyte concentrations at the 0.05 significance level.

Table 4-3 Comparative Statistics for the Present Landfill - UHSU Bedrock

Analyte	ANOVA Method <sup>1</sup>	Probability Value	Well Comparison
<b>Dissolved</b>			
Barium	Nonparametric	0.0181	#
Calcium	Normal	0.0001	* Pool - B207089
Gross Alpha	Normal	0.5517	**
Gross Beta	Normal	0.1916	**
Lithium	Normal	0.0001	* Pool - B207089
Magnesium	Lognormal	0.0001	* Pool - B207089
Manganese	Lognormal	0.0093	* B207089 - Pool
Potassium	Normal	0.0002	* Pool - B207089
Silicon	Lognormal	0.0001	* B207089 - Pool
Sodium	Lognormal	0.0001	* Pool - B207089
Strontium	Normal	0.0001	* Pool - B207089
Strontium-89,90	Normal	0.6464	**
Uranium-233,234	Normal	0.0479	#
Uranium-235	Normal	0.4313	**
Uranium-238	Normal	0.0051	#
<b>Totals</b>			
Americium-241	Normal	0.1388	**
Bicarbonate as CaCO <sub>3</sub>	Nonparametric	0.1143	**
Chloride	Lognormal	0.0001	* Pool - B207089
Fluoride	Normal	0.0073	#
Plutonium-239,240	Normal	0.1823	**
Sulfate	Nonparametric	0.0067	* Pool - B207089
Total Dissolved Solids	Nonparametric	0.0168	* Pool - B207089
Total Suspended Solids	Nonparametric	0.0097	#
Tritium	Normal	0.6429	**

<sup>1</sup> Normal = Data were normally distributed and analyzed using parametric ANOVA methods.

Lognormal = Data were transformed using natural logarithms prior to parametric ANOVA analysis.

Nonparametric = Data were analyzed using distribution-free nonparametric ANOVA methods.

# Identifies a statistically significant difference between some locations. However, no statistical difference exists between the mean upgradient concentration and the concentration in compliance wells.

\* Indicates that the analyte concentrations in the downgradient wells are statistically greater than the mean upgradient concentration.

\*\* Indicates that no statistical difference exists between upgradient and downgradient analyte concentrations at the 0.05 significance level.

**Table 4-4 Activities of Total Radionuclides in UHSU Groundwater at the Present Landfill, 4th Quarter, 1993**

Well	Date	Surficial Materials		Result <sup>1</sup>	Units
		Analyte			
0786	10/12/93	Tritium		176.77	pCi/L
1086	10/13/93	Americium-241		0.009	pCi/L
1086	10/13/93	Plutonium-239,240		0.0025775	pCi/L
1086	10/13/93	Tritium		132.6	pCi/L
5887	10/13/93	Americium-241		0.008	pCi/L
5887	10/13/93	Plutonium-239,240		0.002145	pCi/L
5887	10/13/93	Tritium		83.04	pCi/L
6087	10/27/93	Americium-241		0.004	pCi/L
6087	10/27/93	Plutonium-239,240		0.002	pCi/L
6087	10/27/93	Tritium		170	pCi/L
6187	10/26/93	Americium-241		0.001	pCi/L
6187	10/26/93	Plutonium-239,240		0.003	pCi/L
6187	10/26/93	Tritium		-64	pCi/L
6487	10/15/93	Tritium		118.93	pCi/L
6587	10/18/93	Americium-241		0.012	pCi/L
6587	10/18/93	Plutonium-239,240		0.0050716	pCi/L
6587	10/18/93	Tritium		104.88	pCi/L
6887	10/25/93	Americium-241		0.005	pCi/L
6887	10/25/93	Plutonium-239,240		-0.001	pCi/L
6887	10/25/93	Tritium		-220	pCi/L
70093	11/10/93	Tritium		160	pCi/L
70393	11/12/93	Americium-241		0.026	pCi/L
70393	11/12/93	Plutonium-239,240		0.011	pCi/L
70693	11/11/93	Tritium		230	pCi/L
7087	10/20/93	Tritium		120.01	pCi/L
71493	11/16/93	Tritium		53	pCi/L
7187	11/03/93	Americium-241		-0.0007121	pCi/L
7187	11/03/93	Plutonium-239,240		0.0010586	pCi/L
7187	11/03/93	Tritium		140.44	pCi/L
71893	11/16/93	Americium-241		0.014	pCi/L
71893	11/16/93	Tritium		160	pCi/L
72093	11/16/93	Americium-241		0.013	pCi/L
72093	11/16/93	Plutonium-239,240		0.078	pCi/L
72093	11/16/93	Tritium		2,400	pCi/L
72293	11/16/93	Tritium		400	pCi/L
72393	11/12/93	Americium-241		0.0033	pCi/L
72393	11/12/93	Plutonium-239,240		0.005	pCi/L
72393	11/12/93	Tritium		2,800	pCi/L
7287	10/13/93	Tritium		-42.05	pCi/L
B106089	10/13/93	Tritium		47.48	pCi/L

Table 4-4 Activities of Total Radionuclides in UHSU Groundwater at the Present Landfill, 4th Quarter, 1993 (continued)

Well	Date	Weathered Bedrock		Units
		Analyte	Result <sup>1</sup>	
70193	11/11/93	Tritium	170	pCi/L
70493	11/19/93	Americium-241	-0.005	pCi/L
70493	11/19/93	Plutonium-239,240	0.006	pCi/L
70493	11/19/93	Tritium	120	pCi/L
B206289	10/28/93	Tritium	-250	pCi/L
B206589	11/05/93	Americium-241	0	pCi/L
B206589	11/05/93	Plutonium-239,240	<b>0.003</b>	pCi/L
B206589	11/05/93	Tritium	130	pCi/L
B206789	10/19/93	Tritium	-2.25	pCi/L
B206889	10/19/93	Tritium	-64.83	pCi/L
B206989	10/12/93	Tritium	107.12	pCi/L
B207089	10/12/93	Americium-241	0.0100807	pCi/L
B207089	10/12/93	Plutonium-239,240	0.0008177	pCi/L
B207089	10/12/93	Tritium	22.26	pCi/L

<sup>1</sup> Results shown in bold-faced type exceed sitewide background value (mean plus two standard deviations) for that analyte.

**Table 4-5 Activities of Dissolved Radionuclides in UHSU Groundwater at the Present Landfill, 4th Quarter, 1993**

Well	Date	Surficial Materials		Units
		Analyte	Result <sup>1</sup>	
1086	10/13/93	Gross alpha	-0.024429	pCi/L
1086	10/13/93	Gross beta	-0.668313	pCi/L
1086	10/13/93	Strontium-89,90	-0.0516	pCi/L
1086	10/13/93	Uranium-233,234	0.0920825	pCi/L
1086	10/13/93	Uranium-235	0.176491	pCi/L
1086	10/13/93	Uranium-238	0.084409	pCi/L
5887	10/13/93	Gross alpha	0.672528	pCi/L
5887	10/13/93	Gross beta	1.51364	pCi/L
5887	10/13/93	Strontium-89,90	0.0967	pCi/L
5887	10/13/93	Uranium-233,234	0.173868	pCi/L
5887	10/13/93	Uranium-235	0.0133745	pCi/L
5887	10/13/93	Uranium-238	0.100309	pCi/L
6087	10/27/93	Gross alpha	1.4	pCi/L
6087	10/27/93	Gross beta	0.48	pCi/L
6087	10/27/93	Strontium-89,90	-0.01	pCi/L
6087	10/27/93	Uranium-233,234	0.54	pCi/L
6087	10/27/93	Uranium-235	0.073	pCi/L
6087	10/27/93	Uranium-238	0.4	pCi/L
6187	10/26/93	Gross alpha	0.44	pCi/L
6187	10/26/93	Gross beta	1.7	pCi/L
6187	10/26/93	Strontium-89,90	0.15	pCi/L
6187	10/26/93	Uranium-233,234	0.18	pCi/L
6187	10/26/93	Uranium-235	0.01	pCi/L
6187	10/26/93	Uranium-238	0.2	pCi/L
6487	10/15/93	Gross alpha	3.74383	pCi/L
6487	10/15/93	Gross beta	2.92865	pCi/L
6487	10/15/93	Uranium-233,234	1.11341	pCi/L
6487	10/15/93	Uranium-235	0.238587	pCi/L
6487	10/15/93	Uranium-238	0.483292	pCi/L
6587	10/18/93	Gross alpha	0.304988	pCi/L
6587	10/18/93	Gross beta	2.72576	pCi/L
6587	10/18/93	Strontium-89,90	-0.133	pCi/L
6587	10/18/93	Uranium-233,234	0.366188	pCi/L
6587	10/18/93	Uranium-235	0.170016	pCi/L
6587	10/18/93	Uranium-238	0.137321	pCi/L
6687	10/15/93	Gross alpha	0.215108	pCi/L
6687	10/15/93	Gross beta	1.93787	pCi/L
6687	10/15/93	Uranium-233,234	0.400076	pCi/L
6687	10/15/93	Uranium-235	0.0615502	pCi/L
6687	10/15/93	Uranium-238	0.313906	pCi/L
6887	10/25/93	Gross alpha	1.2	pCi/L
6887	10/25/93	Gross beta	-0.33	pCi/L
6887	10/25/93	Strontium-89,90	-0.02	pCi/L
6887	10/25/93	Uranium-233,234	0.49	pCi/L
6887	10/25/93	Uranium-235	0.066	pCi/L

Table 4-5 Activities of Dissolved Radionuclides in UHSU Groundwater at the Present Landfill, 4th Quarter, 1993 (continued)

Well	Date	Surficial Materials		Units
		Analyte	Result <sup>1</sup>	
6887	10/25/93	Uranium-238	0.78	pCi/L
70093	11/10/93	Gross alpha	0.64	pCi/L
70093	11/10/93	Gross beta	2	pCi/L
70093	11/10/93	Strontium-89,90	0.01	pCi/L
70093	11/10/93	Uranium-233,234	0.36	pCi/L
70093	11/10/93	Uranium-235	-0.016	pCi/L
70093	11/10/93	Uranium-238	0.16	pCi/L
70393	11/12/93	Gross alpha	0.77	pCi/L
70393	11/12/93	Gross beta	0.55	pCi/L
70393	11/12/93	Strontium-89,90	0.17	pCi/L
70393	11/12/93	Uranium-233,234	0.56	pCi/L
70393	11/12/93	Uranium-235	-0.005	pCi/L
70393	11/12/93	Uranium-238	0.55	pCi/L
70693	11/11/93	Gross alpha	0.92	pCi/L
70693	11/11/93	Gross beta	1.6	pCi/L
70693	11/11/93	Strontium-89,90	0.02	pCi/L
70693	11/11/93	Uranium-233,234	0.28	pCi/L
70693	11/11/93	Uranium-235	0	pCi/L
70693	11/11/93	Uranium-238	0.49	pCi/L
71193	11/16/93	Gross alpha	1.9	pCi/L
71193	11/16/93	Gross beta	12	pCi/L
71193	11/16/93	Strontium-89,90	0.037	pCi/L
71193	11/16/93	Uranium-233,234	2.4	pCi/L
71193	11/16/93	Uranium-235	0.23	pCi/L
71193	11/16/93	Uranium-238	1.5	pCi/L
71493	11/16/93	Gross alpha	4.1	pCi/L
71493	11/16/93	Gross beta	3.3	pCi/L
71493	11/16/93	Uranium-233,234	3.6	pCi/L
71493	11/16/93	Uranium-235	0.03	pCi/L
71493	11/16/93	Uranium-238	3.1	pCi/L
7187	11/03/93	Gross alpha	0.873131	pCi/L
7187	11/03/93	Gross beta	0.309621	pCi/L
7187	11/03/93	Strontium-89,90	-0.133	pCi/L
7187	11/03/93	Uranium-233,234	0.623728	pCi/L
7187	11/03/93	Uranium-235	0.198771	pCi/L
7187	11/03/93	Uranium-238	0.747103	pCi/L
71893	11/16/93	Gross alpha	0.73	pCi/L
71893	11/16/93	Gross beta	2.4	pCi/L
71893	11/16/93	Strontium-89,90	0.23	pCi/L
71893	11/16/93	Uranium-233,234	0.59	pCi/L
71893	11/16/93	Uranium-235	0.19	pCi/L
71893	11/16/93	Uranium-238	0.31	pCi/L
72093	11/16/93	Gross alpha	-0.8	pCi/L
72093	11/16/93	Gross beta	1	pCi/L
72093	11/16/93	Radium-226	2.2	pCi/L
72093	11/16/93	Strontium-89,90	0.45	pCi/L
72093	11/16/93	Uranium-233,234	2.5	pCi/L

Table 4-5 Activities of Dissolved Radionuclides in UHSU Groundwater at the Present Landfill, 4th Quarter, 1993 (continued)

Well	Date	Surficial Materials		Units
		Analyte	Result <sup>1</sup>	
72093	11/16/93	Uranium-235	0.019	pCi/L
72093	11/16/93	Uranium-238	2	pCi/L
72293	11/16/93	Gross alpha	11	pCi/L
72293	11/16/93	Gross beta	27	pCi/L
72293	11/16/93	Radium-226	0.36	pCi/L
72293	11/16/93	Uranium-233,234	0.56	pCi/L
72293	11/16/93	Uranium-235	0.021	pCi/L
72293	11/16/93	Uranium-238	0.45	pCi/L
72393	11/12/93	Gross alpha	4.7	pCi/L
72393	11/12/93	Gross beta	13	pCi/L
72393	11/12/93	Radium-226	1.3	pCi/L
72393	11/12/93	Strontium-89,90	0.98	pCi/L
72393	11/12/93	Uranium-233,234	0.28	pCi/L
72393	11/12/93	Uranium-235	0.079	pCi/L
72393	11/12/93	Uranium-238	0.27	pCi/L
7287	10/13/93	Gross alpha	2.73747	pCi/L
7287	10/13/93	Gross beta	2.24889	pCi/L
7287	10/13/93	Uranium-233,234	0.555223	pCi/L
7287	10/13/93	Uranium-235	0.155733	pCi/L
7287	10/13/93	Uranium-238	0.480742	pCi/L
Weathered Bedrock				
Well	Date	Analyte	Result <sup>1</sup>	Units
70193	11/11/93	Gross alpha	2.3	pCi/L
70193	11/11/93	Gross beta	4.8	pCi/L
70193	11/11/93	Strontium-89,90	0.12	pCi/L
70193	11/11/93	Uranium-233,234	1.5	pCi/L
70193	11/11/93	Uranium-235	-0.008	pCi/L
70193	11/11/93	Uranium-238	0.77	pCi/L
70493	11/19/93	Gross alpha	4.1	pCi/L
70493	11/19/93	Gross beta	1.2	pCi/L
70493	11/19/93	Strontium-89,90	0.09	pCi/L
70493	11/19/93	Uranium-233,234	2.5	pCi/L
70493	11/19/93	Uranium-235	0.072	pCi/L
70493	11/19/93	Uranium-238	1.4	pCi/L
B206289	10/28/93	Gross alpha	3.6	pCi/L
B206289	10/28/93	Gross beta	3.3	pCi/L
B206289	10/28/93	Uranium-233,234	3.9	pCi/L
B206289	10/28/93	Uranium-235	0.066	pCi/L
B206289	10/28/93	Uranium-238	1.4	pCi/L
B206589	11/05/93	Gross alpha	42	pCi/L
B206589	11/05/93	Gross beta	19	pCi/L
B206589	11/05/93	Radium-226	0.69	pCi/L
B206589	11/05/93	Strontium-89,90	-0.15	pCi/L
B206589	11/05/93	Uranium-233,234	36	pCi/L
B206589	11/05/93	Uranium-235	0.75	pCi/L

Table 4-5 Activities of Dissolved Radionuclides in UHSU Groundwater at the Present Landfill, 4th Quarter, 1993 (continued)

Well	Date	Weathered Bedrock		Units
		Analyte	Result <sup>1</sup>	
B206589	11/05/93	Uranium-238	23	pCi/L
B206789	10/19/93	Gross alpha	11.1155	pCi/L
B206789	10/19/93	Gross beta	3.74225	pCi/L
B206789	10/19/93	Radium-226	0.27	pCi/L
B206789	10/19/93	Uranium-233,234	4.08086	pCi/L
B206789	10/19/93	Uranium-235	0.16878	pCi/L
B206789	10/19/93	Uranium-238	2.81501	pCi/L
B207089	10/12/93	Gross alpha	2.32398	pCi/L
B207089	10/12/93	Gross beta	4.50861	pCi/L
B207089	10/12/93	Radium-226	0.2	pCi/L
B207089	10/12/93	Strontium-89,90	0.086	pCi/L
B207089	10/12/93	Uranium-233,234	2.04584	pCi/L
B207089	10/12/93	Uranium-235	0.254845	pCi/L
B207089	10/12/93	Uranium-238	1.01938	pCi/L

1 Results shown in bold-faced type exceed sitewide background value (mean plus two standard deviations) for that analyte.

Table 4-7 Concentrations of Total Dissolved Solids in UHSU Groundwater at the Present Landfill, 4th Quarter, 1993

Well	Date	Surficial Materials		Units
		Analyte	Result <sup>1</sup>	
1086	10/13/93	Total dissolved solids	122	mg/L
5887	10/13/93	Total dissolved solids	170	mg/L
6087	10/27/93	Total dissolved solids	184	mg/L
6187	10/26/93	Total dissolved solids	150	mg/L
6487	10/15/93	Total dissolved solids	280	mg/L
6587	10/18/93	Total dissolved solids	230	mg/L
6687	10/15/93	Total dissolved solids	340	mg/L
6887	10/25/93	Total dissolved solids	212	mg/L
70093	11/10/93	Total dissolved solids	320	mg/L
70393	11/12/93	Total dissolved solids	320	mg/L
70693	11/11/93	Total dissolved solids	440	mg/L
71193	11/16/93	Total dissolved solids	251	mg/L
71493	11/16/93	Total dissolved solids	197	mg/L
7187	11/03/93	Total dissolved solids	280	mg/L
71893	11/16/93	Total dissolved solids	220	mg/L
72093	11/16/93	Total dissolved solids	<b>1,181</b>	mg/L
72293	11/16/93	Total dissolved solids	<b>1,728</b>	mg/L
72393	11/12/93	Total dissolved solids	<b>1,200</b>	mg/L
7287	10/13/93	Total dissolved solids	380	mg/L
<hr/>				
Well	Date	Weathered Bedrock		Units
		Analyte	Result <sup>1</sup>	
70193	11/11/93	Total dissolved solids	330	mg/L
70493	11/19/93	Total dissolved solids	190	mg/L
B206289	10/28/93	Total dissolved solids	368	mg/L
B206589	11/05/93	Total dissolved solids	560	mg/L
B206689	10/18/93	Total dissolved solids	600	mg/L
B206789	10/19/93	Total dissolved solids	<b>1,201</b>	mg/L
B207089	10/12/93	Total dissolved solids	<b>1,946</b>	mg/L

<sup>1</sup> Results shown in bold-faced type exceed sitewide background value (mean plus two standard deviations) for that analyte.

Table 4-8 Concentrations of Chloride Detected in UHSU Groundwater at the Present Landfill, 4th Quarter, 1993

Well	Date	Surficial Materials		Units
		Analyte	Result <sup>1</sup>	
1086	10/13/93	Chloride	4.2	mg/L
5887	10/13/93	Chloride	5	mg/L
6087	10/27/93	Chloride	3.536	mg/L
6187	10/26/93	Chloride	4	mg/L
6487	10/15/93	Chloride	<b>45</b>	mg/L
6587	10/18/93	Chloride	4.547	mg/L
6687	10/15/93	Chloride	6	mg/L
6887	10/25/93	Chloride	5.864	mg/L
70093	11/10/93	Chloride	3	mg/L
70393	11/12/93	Chloride	5	mg/L
70693	11/11/93	Chloride	10	mg/L
71193	11/16/93	Chloride	2.394	mg/L
71493	11/16/93	Chloride	6.486	mg/L
7187	11/03/93	Chloride	5.1	mg/L
71893	11/16/93	Chloride	6	mg/L
72093	11/16/93	Chloride	<b>66.13</b>	mg/L
72293	11/16/93	Chloride	<b>208.5</b>	mg/L
72393	11/12/93	Chloride	<b>170</b>	mg/L
7287	10/13/93	Chloride	6	mg/L

  

Well	Date	Weathered Bedrock		Units
		Analyte	Result <sup>1</sup>	
70193	11/11/93	Chloride	2	mg/L
70493	11/19/93	Chloride	2	mg/L
B206289	10/28/93	Chloride	1.149	mg/L
B206589	11/05/93	Chloride	<b>75</b>	mg/L
B206689	10/18/93	Chloride	<b>80.17</b>	mg/L
B206789	10/19/93	Chloride	<b>69.03</b>	mg/L
B207089	10/12/93	Chloride	<b>498.6</b>	mg/L

1 Results shown in bold-faced type exceed sitewide background value (mean plus two standard deviations) for that analyte.

Table 4-9 Concentrations of Dissolved Calcium Detected in UHSU Groundwater  
at the Present Landfill, 4th Quarter, 1993

Well	Date	Surficial Materials		Units
		Analyte	Result <sup>1</sup>	
1086	10/13/93	Calcium	15.1	mg/L
5887	10/13/93	Calcium	21.7	mg/L
6087	10/27/93	Calcium	23.2	mg/L
6187	10/26/93	Calcium	20.9	mg/L
6487	10/15/93	Calcium	54.8	mg/L
6587	10/18/93	Calcium	36.1	mg/L
6687	10/15/93	Calcium	52.2	mg/L
6887	10/25/93	Calcium	34.9	mg/L
71493	11/16/93	Calcium	29.9	mg/L
7187	11/03/93	Calcium	69.4	mg/L
72093	11/16/93	Calcium	<b>216</b>	mg/L
72293	11/16/93	Calcium	<b>260</b>	mg/L

  

Well	Date	Weathered Bedrock		Units
		Analyte	Result <sup>1</sup>	
B206289	10/28/93	Calcium	75.9	mg/L
B206589	11/05/93	Calcium	97.2	mg/L
B207089	10/12/93	Calcium	<b>151</b>	mg/L

<sup>1</sup> Results shown in bold-faced type exceed sitewide background value (mean plus two standard deviations) for that analyte.

Table 5-1 Wells Used for Statistical Comparisons of Upgradient Versus Downgradient Water Quality in the UHSU (1991, 1992, 1993)

Solar Evaporation Ponds	
Upgradient Wells	Downgradient Wells
2486	2686
P207389	2886
P207489	3086
P209289	3186
P209389	3787
	3887
	P207589
	P207689
	P207789
	P207889
	P207989
	P208989
	P209589
	P209689
	P209789

  

West Spray Field	
Upgradient Wells	Downgradient Wells
5186	5086
	B110889
	B110989
	B111189
	B410589
	B410689
	B410789

  

Present Landfill	
Upgradient Wells	Downgradient Wells
1086	4087
5887	B206989
	B207089

Table 5-2 Comparative Statistics for the Solar Evaporation Ponds - UHSU 1991

Analyte	ANOVA Method <sup>1</sup>	Probability Value	Well Comparison
Dissolved			
Aluminum	Nonparametric	0.0016	* Pool - 2686, 3086, P207689, P208989, P209489
Antimony	Nonparametric	0.0007	* Pool - 2686, 3086, P208989
Barium	Nonparametric	0.0005	#
Calcium	Nonparametric	0.0001	* Pool - 3086, P208989, P209489
Chromium	Nonparametric	0.0268	* Pool - 3086
Gross Alpha	Nonparametric	0.0001	* Pool - 2686, 2886, 3086, P208989, P209489
Gross Beta	Nonparametric	0.0004	* Pool - 2886, 3086, P208989, P209489
Lithium	Nonparametric	0.0001	* Pool - 2686, 2886, 3086, P208989, P209489
Magnesium	Nonparametric	0.0001	* Pool - 2686, 3086, P207689, P208989
Manganese	Nonparametric	0.0004	* Pool - P209489
Molybdenum	Nonparametric	0.0003	* Pool - 2686, 2886, 3086, P208989
Potassium	Nonparametric	0.0001	#
Radium-226	Nonparametric	0.0518	**
Radium-228	Nonparametric		
Selenium	Nonparametric	0.0002	* Pool - 2686, P207689, P207889, P208989
Sodium	Nonparametric	0.0001	* Pool - 2686, 2886, 3086, P208989, P209489
Strontium	Nonparametric	0.0001	* Pool - 2686, 3086, P207689, P208989
Strontium - 89, 90	Nonparametric	0.5742	**
Tin	Nonparametric	0.0011	* Pool - 3086, P207689, P208989
Uranium - 233,234	Nonparametric	0.0001	* Pool - 2686, 2886, 3086, P208989, P209489
Uranium - 235	Nonparametric	0.0001	* Pool - 2686, 2886, 3086, P208989, P209489
Uranium - 238	Nonparametric	0.0001	* Pool - 2686, 2886, 3086, P208989, P209489
Vanadium	Nonparametric	0.1592	**

Table 5-2 Comparative Statistics for the Solar Evaporation Ponds - UHSU 1991 (continued)

Analyte	ANOVA Method <sup>1</sup>	Probability Value	Well Comparison
Total			
Aluminum		0.0520	**
Americium-241	Nonparametric	0.1301	**
Barium	Nonparametric	0.0391	#
Bicarbonate as CaCO <sub>3</sub>	Nonparametric	0.0001	* Pool - 2686, 2886, 3887, P207689
Cadmium		0.2665	**
Calcium	Nonparametric	0.0500	**
Cesium-137	Normal	0.1287	**
Chloride	Nonparametric	0.0001	* Pool - 3086, P207989, P208989, P209589
Chromium	Nonparametric	0.0756	**
Fluoride	Nonparametric	0.0001	* Pool - 2686, 3887, P207689, P207889, P207989
Iron		0.0746	**
Lithium	Nonparametric	0.0330	* Pool - 3086, P208989, P209489
Magnesium		0.0346	* Pool - 3086, P208989
Manganese		0.0791	**
Molybdenum		0.0308	* Pool - P208989
Nickel		0.0715	**
Nitrate/Nitrite	Nonparametric	0.0001	* Pool - 2886, 3086, P207689, P208989, P209489, P209589
Plutonium-239,240	Nonparametric	0.1188	**
Potassium	Nonparametric	0.0330	#
Selenium		0.1137	**
Silicon (diss-hist)	Normal	0.0001	* Pool - P207689, 2886, P208989
Sodium	Nonparametric	0.0318	* Pool - 3086, P208989, P209489
Strontium	Nonparametric	0.0331	* Pool - 3086, P207689, P208989
Sulfate	Nonparametric	0.0001	* Pool - 3086, P207889, P207989, P209589
Tin		0.1034	**
Vanadium		0.6416	**
Total Dissolved Solids	Nonparametric	0.0001	* Pool - 2686, 2886, 3086, P208989, P209489, P209589
Total Suspended Solids		0.0002	* Pool - 3086, 3787, 3887, P20689, P208989, P209489, P209589, P209789
Tritium	Nonparametric	0.0001	* Pool - P209589
Zinc		0.5272	**

Table 5-2 Comparative Statistics for the Solar Evaporation Ponds - UHSU 1991 (continued)

- 1 Normal = Data were normally distributed and analyzed using parametric ANOVA methods.
- Lognormal = Data were transformed using natural logarithms prior to parametric ANOVA analysis.
- Nonparametric = Data were analyzed using distribution-free nonparametric ANOVA methods.
- # Identifies a statistically significant difference between some locations. However, no statistical difference exists between the mean upgradient concentration and the concentration in compliance wells.
- \* Indicates that the analyte concentrations in the downgradient wells are statistically greater than the mean upgradient concentration.
- \*\* Indicates that no statistical difference exists between upgradient and downgradient analyte concentrations at the 0.05 significance level.

Table 5-3 Comparative Statistics for the Solar Evaporation Ponds - UHSU 1992

Analyte	ANOVA Method <sup>1</sup>	Probability Value	Well Comparison
Dissolved			
Aluminum	Nonparametric	0.0300	* Pool - P208989, 3086
Barium	Nonparametric	0.0005	#
Calcium	Nonparametric	0.0034	* Pool - P208989, 3086
Gross Alpha	Nonparametric	0.0014	* Pool - 2886, 3086, P208989
Gross Beta	Nonparametric	0.0002	* Pool - 2886, 3086, P208989, P209489
Lithium	Nonparametric	0.0001	* Pool - 2886, 3086, P208989, P209489
Magnesium	Nonparametric	0.0005	* Pool - 2686, 3086, P207689, P208989
Manganese	Nonparametric	0.0010	* Pool - P209489, 2886
Potassium	Nonparametric	0.0001	* Pool - 2886
Radium-226	Nonparametric	0.0207	#
Selenium	Nonparametric	0.0002	* Pool - 2686, P207689, P207889, P208989
Silicon	Nonparametric	0.0043	#
Sodium	Nonparametric	0.0001	* Pool - 2886, 3086, P208989, P209489
Strontium	Nonparametric	0.0003	* Pool - 2686, 3086, P207689, P208989
Strontium-89, 90	Nonparametric	0.4269	**
Uranium-233,234	Nonparametric	0.0008	* Pool - P207989, 3086, P208989, P209489
Uranium-235	Nonparametric	0.0008	* Pool - P207989, 3086, P208989, P209489
Uranium-238	Nonparametric	0.0008	* Pool - 3086, P208989, P209489
Zinc	Nonparametric	0.0318	#
Totals			
Aluminum	Nonparametric	0.0024	* Pool - P207689, 3086, P209789
Americium-241	Nonparametric	0.3195	**
Barium	Nonparametric	0.0002	#
Bicarbonate as CaCO <sub>3</sub>	Nonparametric	0.0002	* Pool - 2686, 2886, 3787, P207689
Calcium	Nonparametric	0.0007	* Pool - P208989, 3086, P209489
Cesium-137	Nonparametric	0.4962	**
Chloride	Nonparametric	0.0022	* Pool - 3086, P207989, P208989, P209589
Fluoride	Nonparametric	0.0001	* Pool - 2686, 3086, P207689, P207989
Iron	Nonparametric	0.0053	* Pool - P207689, P209789,
Lithium	Nonparametric	0.0001	* Pool - 3086, P208989, 2886, P209489

Table 5-3 Comparative Statistics for the Solar Evaporation Ponds - UHSU 1992 (continued)

Analyte	ANOVA Method <sup>1</sup>	Probability Value	Well Comparison
Magnesium	Nonparametric	0.0002	* Pool - 3086, P208989, 2686, 2886, P207689
Manganese	Nonparametric	0.0070	* Pool - P209489, 2886
Nitrate/Nitrite	Nonparametric	0.0001	* Pool - 2886, 3086, P208989, P209489, P209589
Plutonium-239,240	Nonparametric	0.3481	**
Potassium	Nonparametric	0.0001	* Pool - P209489, 2886, 3086
Selenium	Nonparametric	0.0002	* Pool - P207689, 2686, P207889, P208989
Silicon	Normal	0.0001	* Pool - P207689
Sodium	Nonparametric	0.0001	* Pool - 2886, 3086, P208989, P209489
Strontium	Nonparametric	0.0001	* Pool - 2886, 2686, 3086, P207689, P208989
Sulfate	Nonparametric	0.0002	* Pool - 2686, 3086, P207889, P207989, P209589
Zinc	Nonparametric	0.4587	**
Total Dissolved Solids	Nonparametric	0.0001	* Pool - 2686, 2886, 3086, P208989, P209489, P209589
Total Suspended Solids	Nonparametric	0.0012	* Pool - 3086, 3787, P207689, P209489, P209789
Tritium	Nonparametric	0.0011	* Pool - P208989, 3086

<sup>1</sup> Normal = Data were normally distributed and analyzed using parametric ANOVA methods.

Lognormal = Data were transformed using natural logarithms prior to parametric ANOVA analysis.

Nonparametric = Data were analyzed using distribution-free nonparametric ANOVA methods.

- # Identifies a statistically significant difference between some locations. However, no statistical difference exists between the mean upgradient concentration and the concentration in compliance wells.
- \* Indicates that the analyte concentrations in the downgradient wells are statistically greater than the mean upgradient concentration.
- \*\* Indicates that no statistical difference exists between upgradient and downgradient analyte concentrations at the 0.05 significance level.

Table 5-4 Comparative Statistics for the Solar Evaporation Ponds - UHSU 1993

Analyte	ANOVA Method <sup>1</sup>	Probability Value	Well Comparison
Dissolved			
Barium	Nonparametric	0.0006	#
Calcium	Nonparametric	0.0017	* Pool - P208989, 3086, P209489
Gross Alpha	Nonparametric	0.0006	* Pool - 2686, 3086, P208989, P209489
Gross Beta	Nonparametric	0.0010	* Pool - P208989, 3086, P209489
Lithium	Nonparametric	0.0004	* Pool - P208989, 3086, P209489
Magnesium	Nonparametric	0.0004	* Pool - P207689, 3086, P207889, P208989
Manganese	Nonparametric	0.0019	* Pool - P209489
Potassium	Nonparametric	0.0017	* Pool - P209489
Radium	Nonparametric	0.0177	* Pool - P208989
Silicon	Nonparametric	0.0006	#
Sodium	Nonparametric	0.0003	* Pool - P208989, 3086, P209489
Strontium	Lognormal	0.0001	* Pool - P208989, 3086, P207689, P207889, P209789, P209489
Strontium-89,90	Nonparametric	0.6909	**
Total Radiocesium	Nonparametric	0.8886	**
Uranium-233,234	Nonparametric	0.0025	* Pool - 2686, 3086, P208989, P209489
Uranium-235	Nonparametric	0.0048	* Pool - 2686, 3086, P208989, P209489
Uranium-238	Nonparametric	0.0031	* Pool - 2686, 3086, P208989, P209489
Total			
Americium-241	Nonparametric	0.1336	**
Bicarbonate as CaCO <sub>3</sub>	Nonparametric	0.0004	* Pool - 2686, 3086, P207689
Chloride	Nonparametric	0.0005	* Pool - P207989, P209589
Fluoride	Lognormal	0.0001	* Pool - P207989, 2686, P207689, 3086, P207889, P209789
Nitrate/Nitrite	Nonparametric	0.0001	* Pool - P208989, 3086, P209489, P209589
Plutonium-239,240	Nonparametric	0.4542	**
Sulfate	Nonparametric	0.0005	* Pool - 2686, P207889, P207989, P209589

Table 5-4 Comparative Statistics for the Solar Evaporation Ponds - UHSU 1993 (continued)

Analyte	ANOVA Method <sup>1</sup>	Probability Value	Well Comparison
Total Dissolved Solids	Nonparametric	0.0001	* Pool - 2686, 3086, P208989, P209489, P209589
Total Suspended Solids	Nonparametric	0.0054	* Pool - P207689
Tritium	Normal	0.0001	* Pool - P208989, 3086, P209489, P209789

<sup>1</sup> Normal = Data were normally distributed and analyzed using parametric ANOVA methods.

Lognormal = Data were transformed using natural logarithms prior to parametric ANOVA analysis.

Nonparametric = Data were analyzed using distribution-free nonparametric ANOVA methods.

- # Identifies a statistically significant difference between some locations. However, no statistical difference exists between the mean upgradient concentration and the concentration in compliance wells.
- Indicates that the analyte concentrations in the downgradient wells are statistically greater than the mean upgradient concentration.
- \*\* Indicates that no statistical difference exists between upgradient and downgradient analyte concentrations at the 0.05 significance level.

Table 5-5 Comparative Statistics for the West Spray Field - UHSU 1991

Analyte	ANOVA Method <sup>1</sup>	Probability Value	Well Comparison
Dissolved			
Aluminum	Nonparametric	0.0763	**
Barium	Nonparametric	0.0006	* Pool - B410789
Calcium	Nonparametric	0.0003	* Pool - B410789
Gross Beta	Nonparametric	0.1184	**
Lithium	Nonparametric	0.0905	**
Magnesium	Nonparametric	0.0003	* Pool - B410589, B410789
Manganese	Nonparametric	0.2079	**
Potassium	Nonparametric	0.0031	#
Sodium	Normal	0.0001	* Pool - B111189, B110989, B110889, B410789
Strontium	Normal	0.0001	* Pool - B410789, B410589, B110889, 5086, B410689
Strontium-89, 90	Normal	0.6990	**
Uranium-233,234	Nonparametric	0.0012	* Pool - B410589, B410789
Uranium-235	Normal	0.1745	**
Uranium-238	Normal	0.0001	* Pool - B410589, B410789
Total			
Aluminum	Nonparametric	0.1538	**
Americium-241	Nonparametric	0.8217	**
Antimony	Nonparametric	0.0474	#
Barium	Nonparametric	0.0764	**
Bicarbonate as CaCO <sub>3</sub>	Nonparametric	0.0024	* Pool - B110889, B410589, B4107789
Calcium	Nonparametric	0.0213	* Pool - B410789
Cesium-137	Normal	0.4348	**
Chloride	Nonparametric	0.0008	* Pool - B410789
Chromium	Nonparametric	0.0993	**
Copper	Nonparametric	0.0701	**
Fluoride	Nonparametric	0.0008	* Pool - B110889, B410589, B410689
Iron	Nonparametric	0.27748	**
Lead	Nonparametric	0.1301	**
Lithium	Nonparametric	0.3304	**
Magnesium	Nonparametric	0.0371	#
Manganese	Nonparametric	0.0606	**
Nitrate/Nitrite	Lognormal	0.0001	* Pool - B410789, B410689, B110889, B410589, B110989, 5086, B111189 - Pool
Orthophosphate	Nonparametric	0.2721	**
Plutonium - 239,240	Nonparametric	0.2323	**
Potassium	Nonparametric	0.1732	**

Table 5-5 Comparative Statistics for the West Spray Field - UHSU 1991 (continued)

Analyte	ANOVA Method <sup>1</sup>	Probability Value	Well Comparison
Silica (diss-hist)	Nonparametric	0.0016	#
Sodium	Lognormal	0.0001	* Pool - B111189, B110989, B110889, B410789
Strontium	Nonparametric	0.0290	* Pool - B410789
Sulfate	Normal	0.0001	* B410789, B410589, 5086, B110889, B111189, B410689, B110989 - Pool
Total Dissolved Solids	Nonparametric	0.0016	* Pool - B410789
Total Suspended Solids	Nonparametric	0.0575	**
Tritium	Normal	0.0308	#
Vanadium	Nonparametric	0.1362	**
Zinc	Nonparametric	0.0301	#

<sup>1</sup> Normal = Data were normally distributed and analyzed using parametric ANOVA methods.

Lognormal = Data were transformed using natural logarithms prior to parametric ANOVA analysis.

Nonparametric = Data were analyzed using distribution-free nonparametric ANOVA methods.

- # Identifies a statistically significant difference between some locations. However, no statistical difference exists between the mean upgradient concentration and the concentration in compliance wells.
- Indicates that the analyte concentrations in the downgradient wells are statistically greater than the mean upgradient concentration.
- \*\* Indicates that no statistical difference exists between upgradient and downgradient analyte concentrations at the 0.05 significance level.

**Table 5-6 Comparative Statistics for the West Spray Field - UHSU 1992**

Analyte	ANOVA Method <sup>1</sup>	Probability Value	Well Comparison
Dissolved			
Barium	Nonparametric	0.0009	*
Calcium	Normal	0.0001	* Pool - B410789,
			B410589, 5086,
Gross Alpha	Nonparametric	0.0094	B410689, B110889
Gross Beta	Nonparametric	0.4853	• Pool - B410589,
Magnesium	Nonparametric	0.0001	B410789
Silicon	Nonparametric	0.0172	#
Sodium	Nonparametric	0.0045	* Pool - B111189,
Strontium	Normal	0.0001	B110989
Strontium-89,90	Nonparametric	0.4398	* Pool - B410789,
Uranium-233,234	Nonparametric	0.0389	B410589, B110889,
Uranium-235	Nonparametric	0.9005	5086, B410689
Uranium-238	Nonparametric	0.0160	**
			* Pool - B410589
Totals			
Aluminum	Nonparametric	0.0654	**
Americium-241	Nonparametric	0.3907	**
Barium	Nonparametric	0.0730	**
Bicarbonate as CaCO <sub>3</sub>	Nonparametric	0.0003	* Pool - B110889, 5086,
Calcium	Nonparametric	0.0002	B410589, B410789
Cesium-137	Normal	0.7818	* Pool - B410589,
Chloride	Nonparametric	0.0008	B410789
Fluoride	Nonparametric	0.0017	* Pool - B110889,
Iron	Nonparametric	0.0549	B410689, B410589
Lead	Nonparametric	0.1101	**
Magnesium	Nonparametric	0.0007	* Pool - B410589,
Manganese	Nonparametric	0.0205	B410789
Nitrate/Nitrite	Nonparametric	0.0001	#
Plutonium-239,240	Nonparametric	0.9875	#
Potassium	Nonparametric	0.1624	**
Silicon	Nonparametric	0.1907	**
Sodium	Nonparametric	0.0001	* Pool - B111189,
Strontium	Nonparametric	0.0002	B110989, B110889
Sulfate	Nonparametric	0.0005	• Pool - B410589,
			B410789

Table 5-6 Comparative Statistics for the West Spray Field - UHSU 1992 (continued)

Analyte	ANOVA Method <sup>1</sup>	Probability Value	Well Comparison
Total Dissolved Solids	Lognormal	0.0001	* Pool - B410789, B410589
Total Suspended Solids	Lognormal	0.0084	* B110889 - Pool
Tritium	Nonparametric	0.4714	**
Zinc	Nonparametric	0.0400	#

<sup>1</sup> Normal = Data were normally distributed and analyzed using parametric ANOVA methods.

Lognormal = Data were transformed using natural logarithms prior to parametric ANOVA analysis.

Nonparametric = Data were analyzed using distribution-free nonparametric ANOVA methods.

- # Identifies a statistically significant difference between some locations. However, no statistical difference exists between the mean upgradient concentration and the concentration in compliance wells.
- \* Indicates that the analyte concentrations in the downgradient wells are statistically greater than the mean upgradient concentration.
- \*\* Indicates that no statistical difference exists between upgradient and downgradient analyte concentrations at the 0.05 significance level.

Table 5-7 Comparative Statistics for the West Spray Field - UHSU 1993

Analyte	ANOVA Method <sup>1</sup>	Probability Value	Well Comparison
Dissolved			
Barium	Normal	0.0001	• Pool - B410789, 5086, B110889, 5086, B110889, B111189 - Pool
Calcium	Lognormal	0.0001	* Pool - B410789, B410589, B410689, 5086. B110889, B111189 - Pool
Gross Alpha	Nonparametric	0.0390	* Pool - B110889, B410589
Gross Beta	Nonparametric	0.1646	**
Lithium	Nonparametric	0.3532	**
Magnesium	Lognormal	0.0001	* Pool - B410589, 5086, B410789, B110889, B410589, B410689, B110989, B111189 - Pool
Potassium	Nonparametric	0.1800	**
Silicon	Normal	0.0012	#
Sodium	Normal	0.0001	* Pool - B111189, B110989, B110889, B410789, B410689
Strontium	Normal	0.0001	* Pool - B410789, B410589, B110889, B410689, 5086
Strontium-89,90	Normal	0.1816	**
Total Radiocesium	Nonparametric	0.1516	**
Uranium-233,234	Nonparametric	0.0536	**
Uranium-235	Nonparametric	0.1761	**
Uranium-238	Nonparametric	0.3954	**
Zinc	Nonparametric	0.0649	**
Total			
Americium-241	Normal	0.0131	#
Bicarbonate as CaCO <sub>3</sub>	Nonparametric	0.0020	* Pool - B110889, B410689, B410789
Chloride	Normal	0.0001	* Pool - B410789, 5086, B410589, B410889, B410689, B110989
Fluoride	Normal	0.0001	* Pool - B410589, B410689, B110889, B410789, B111189

Table 5-7 Comparative Statistics for the West Spray Fields - UHSU 1993 (continued)

Analyte	ANOVA Method <sup>1</sup>	Probability Value	Well Comparison
Nitrate/Nitrite	Nonparametric	0.0056	#
Plutonium-239,240	Nonparametric	0.1280	**
Sulfate	Nonparametric	0.0008	#
Total Dissolved Solids	Nonparametric	0.1532	**
Total Suspended Solids	Normal	0.3422	**
Tritium	Normal	0.3422	**

<sup>1</sup> Normal = Data were normally distributed and analyzed using parametric ANOVA methods.

Lognormal = Data were transformed using natural logarithms prior to parametric ANOVA analysis.

Nonparametric = Data were analyzed using distribution-free nonparametric ANOVA methods.

# Identifies a statistically significant difference between some locations. However, no statistical difference exists between the mean upgradient concentration and the concentration in compliance wells.

\* Indicates that the analyte concentrations in the downgradient wells are statistically greater than the mean upgradient concentration.

\*\* Indicates that no statistical difference exists between upgradient and downgradient analyte concentrations at the 0.05 significance level.

Table 5-8 Comparative Statistics for the Present Landfill - UHSU 1991

Analyte	ANOVA Method <sup>1</sup>	Probability Value	Well Comparison
Dissolved			
Aluminum	Nonparametric	0.3336	**
Barium	Nonparametric	0.0203	#
Calcium	Normal	0.0001	* Pool - B207089
Chromium	Nonparametric	0.0686	**
Gross Alpha	Nonparametric	0.0116	* Pool - B207089
Gross Beta	Nonparametric	0.0258	* Pool - B207089
Lithium	Nonparametric	0.0190	* Pool - B207089
Magnesium	Normal	0.0001	* Pool - B207089
Manganese	Nonparametric	0.2991	**
Molybdenum	Nonparametric	0.0197	* Pool - B207089
Nickel	Nonparametric	0.6873	**
Potassium	Nonparametric	0.0146	* Pool - B207089
Sodium	Nonparametric	0.0064	* Pool - B207089
Strontium	Lognormal	0.0001	* Pool - B207089
Strontium-89,90	Nonparametric	0.1245	**
Tin	Nonparametric	0.0950	**
Uranium-233,234	Nonparametric	0.0163	* Pool - B207089
Uranium-235	Nonparametric	0.0719	**
Uranium-238	Nonparametric	0.0100	* Pool - B207089
Vanadium	Nonparametric	0.5753	**
Zinc	Nonparametric	0.0865	**
Totals			
Aluminum	Nonparametric	0.1017	**
Americium-241	Normal	0.1285	**
Barium	Nonparametric	0.1801	**
Bicarbonate as CaCO <sub>3</sub>	Normal	0.0001	* Pool - B207089
Calcium	Nonparametric	0.1017	**
Chloride	Nonparametric	0.0213	* Pool - B207089
Chromium	Nonparametric	0.1017	**
Fluoride	Nonparametric	0.0967	**
Iron	Nonparametric	0.1017	**
Lead	Nonparametric	0.0951	**
Magnesium	Nonparametric	0.1017	**
Manganese	Nonparametric	0.1561	**
Nitrate/Nitrite	Normal	0.0245	* B207089 - Pool
Orthophosphate	Nonparametric	0.1973	**
Plutonium-239,240	Normal	0.8140	**
Potassium	Nonparametric	0.1801	**
Silicon (diss-hist)	Normal	0.0001	* B207089 - Pool
Sulfate	Nonparametric	0.0522	**
Total Dissolved Solids	Normal	0.0001	* Pool - B207089
Total Suspended Solids	Normal	0.4876	**
Tritium	Nonparametric	0.1469	**

Table 5-8 Comparative Statistics for the Present Landfill - UHSU 1991 (continued)

1 Normal = Data were normally distributed and analyzed using parametric ANOVA methods.

Lognormal = Data were transformed using natural logarithms prior to parametric ANOVA analysis.

Nonparametric = Data were analyzed using distribution-free nonparametric ANOVA methods.

- # Identifies a statistically significant difference between some locations. However, no statistical difference exists between the mean upgradient concentration and the concentration in compliance wells.
- Indicates that the analyte concentrations in the downgradient wells are statistically greater than the mean upgradient concentration.
- \*\* Indicates that no statistical difference exists between upgradient and downgradient analyte concentrations at the 0.05 significance level.

Table 5-9 Comparative Statistics for the Present Landfill - UHSU 1992

Analyte	ANOVA Method <sup>1</sup>	Probability Value	Well Comparison
Dissolved			
Aluminum	Nonparametric	0.4586	**
Barium	Lognormal	0.1098	**
Calcium	Normal	0.0001	* Pool - B207089, 4087
Gross Alpha	Nonparametric	0.0764	**
Gross Beta	Normal	0.0107	* Pool - B207089, 4087
Lithium	Nonparametric	0.0199	* Pool - B207089, 4087
Magnesium	Lognormal	0.0001	* Pool - B207089, 4087
Manganese	Nonparametric	0.0170	* Pool - B207089, 4087
Potassium	Nonparametric	0.0080	* Pool - B207089
Silicon	Normal	0.0021	* B207089 - Pool
Sodium	Lognormal	0.0001	* Pool - B207089, 4087
Strontium	Lognormal	0.0001	* Pool - B207089, 4087
Strontium-89,90	Normal	0.9849	**
Uranium-233,234	Nonparametric	0.0285	* Pool - B207089, 4087
Uranium-235	Nonparametric	0.1678	**
Uranium-238	Nonparametric	0.0343	* Pool - B207089, 4087
Zinc	Nonparametric	0.0374	#
Total			
Aluminum	Lognormal	0.0343	* B207089 - Pool
Americium-241	Normal	0.6186	**
Barium	Nonparametric	0.0228	#
Bicarbonate as CaCO <sub>3</sub>	Lognormal	0.0001	* Pool - B207089, 4087
Calcium	Normal	0.0001	* Pool - B207089
Cesium-137	Normal	0.2491	**
Chem Oxygen Demand	Nonparametric	0.5990	**
Chloride	Normal	0.0001	* Pool - B207089
Chromium	Nonparametric	0.0561	**
Fluoride	Nonparametric	0.0145	* Pool - B207089, 4087
Iron	Lognormal	0.0262	* B207089 - Pool
Lithium	Nonparametric	0.0207	* Pool - B207089
Magnesium	Normal	0.0001	* Pool - B207089
Manganese	Normal	0.3179	**
Nickel	Nonparametric	0.0345	#
Nitrate/Nitrite	Nonparametric	0.0066	#
Plutonium-239,240	Normal	0.8645	**
Potassium	Nonparametric	0.0210	* Pool - B207089
Silicon	Lognormal	0.0025	* B207089 - Pool
Sodium	Nonparametric	0.0210	* Pool - B207089
Strontium	Lognormal	0.0001	* Pool - B207089
Sulfate	Nonparametric	0.0207	* Pool - B207089, 4087
Total Dissolved Solids	Nonparametric	0.0073	* Pool - B207089
Total Organic Carbon	Nonparametric	0.5328	**
Total Suspended Solids	Lognormal	0.0590	**
Tritium	Normal	0.5588	**
Zinc	Lognormal	0.1407	**

Table 5-9 Comparative Statistics for the Present Landfill - UHSU 1992 (continued)

I Normal = Data were normally distributed and analyzed using parametric ANOVA methods.

Lognormal = Data were transformed using natural logarithms prior to parametric ANOVA analysis.

Nonparametric = Data were analyzed using distribution-free nonparametric ANOVA methods.

- # Identifies a statistically significant difference between some locations. However, no statistical difference exists between the mean upgradient concentration and the concentration in compliance wells.
- Indicates that the analyte concentrations in the downgradient wells are statistically greater than the mean upgradient concentration.
- \*\* Indicates that no statistical difference exists between upgradient and downgradient analyte concentrations at the 0.05 significance level.

Table 5-10 Comparative Statistics for the Present Landfill - UHSU 1993

Analyte	ANOVA Method <sup>1</sup>	Probability Value	Well Comparison
Dissolved			
Barium	Nonparametric	0.0429	#
Calcium	Normal	0.0001	* Pool - B207089
Gross Alpha	Nonparametric	0.1561	**
Gross Beta	Nonparametric	0.1017	**
Lithium	Nonparametric	0.0376	* Pool - B207089
Magnesium	Normal	0.0001	* Pool - B207089
Potassium	Nonparametric	0.0181	* Pool - B207089
Silicon	Nonparametric	0.0302	#
Sodium	Nonparametric	0.0349	* Pool - B207089
Strontium	Nonparametric	0.0181	* Pool - B207089
Strontium-89, 90	Normal	0.8823	**
Uranium-233,234	Nonparametric	0.0795	**
Uranium-235	Nonparametric	0.6889	**
Uranium-238	Normal	0.0858	**
Zinc	Nonparametric	0.0553	**
Total			
Americium-241	Normal	0.9857	**
Bicarbonate as CaCO <sub>3</sub>	Nonparametric	0.0379	* Pool - B207089
Chloride	Nonparametric	0.0277	* Pool - B207089
Fluoride	Normal	0.0162	* Pool - B207089
Nitrate/Nitrite	Nonparametric	0.0578	**
Plutonium-239,240	Normal	0.7284	**
Sulfate	Normal	0.0001	* Pool - B207089
Total Dissolved Solids	Nonparametric	0.0314	* Pool - B207089
Total Suspended Solids	Normal	0.2265	**
Tritium	Nonparametric	0.4492	**
Total Organic Carbon	Nonparametric	0.8457	**

<sup>1</sup> Normal = Data were normally distributed and analyzed using parametric ANOVA methods.

Lognormal = Data were transformed using natural logarithms prior to parametric ANOVA analysis.

Nonparametric = Data were analyzed using distribution-free nonparametric ANOVA methods.

- # Identifies a statistically significant difference between some locations. However, no statistical difference exists between the mean upgradient concentration and the concentration in compliance wells.
- \* Indicates that the analyte concentrations in the downgradient wells are statistically greater than the mean upgradient concentration.
- \*\* Indicates that no statistical difference exists between upgradient and downgradient analyte concentrations at the 0.05 significance level.

**Table 5-11 Summary of Analytes Present at Higher Concentrations  
in Downgradient UHSU Groundwater Relative to Upgradient UHSU Groundwater  
at the Solar Evaporation Ponds**

Analyte—Metals	1991	1992	1993
Aluminum - total		X	
Aluminum - dissolved	X	X	
Antimony - total			
Antimony - dissolved	X		
Barium - total			
Barium - dissolved			
Calcium - total		X	
Calcium - dissolved	X	X	X
Chromium - total			
Chromium - dissolved	X		
Iron - total		X	
Iron - dissolved			
Lithium - total	X	X	
Lithium - dissolved	X	X	X
Magnesium - total	X	X	
Magnesium - dissolved	X	X	X
Manganese - total		X	
Manganese - dissolved	X	X	X
Molybdenum - total	X		
Molybdenum - dissolved	X		
Potassium - total		X	
Potassium - dissolved		X	X
Selenium - total		X	
Selenium - dissolved	X	X	
Silicon - total	X	X	
Silicon - dissolved			
Sodium - total	X	X	
Sodium - dissolved	X	X	X

**Table 5-11 Summary of Analytes Present at Higher Concentrations  
in Downgradient UHSU Groundwater Relative to Upgradient UHSU Groundwater  
at the Solar Evaporation Ponds (continued)**

<b>Analyte—Metals</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>
Strontium - total	X	X	
Strontium - dissolved	X	X	X
Tin - total			
Tin - dissolved	X		
<b>Analyte—Radionuclides</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>
Gross alpha - total			
Gross alpha - dissolved	X	X	X
Gross beta - total			
Gross beta - dissolved	X	X	X
Radium-226 - total			
Radium-226 - dissolved			X
Tritium	X	X	X
Uranium-233, 234 - total			
Uranium-233, 234 - dissolved	X	X	X
Uranium 235 - total			
Uranium 235 - dissolved	X	X	X
Uranium 238 - total			
Uranium 238 - dissolved	X	X	X
<b>Analyte—Water Quality Parameters</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>
Bicarbonate	X	X	X
Chloride	X	X	X
Fluoride	X	X	X
Nitrate/Nitrite	X	X	X
Sulfate	X	X	X
Total Dissolved Solids	X	X	X
Total Suspended Solids	X	X	X

**Table 5-12 Summary of Analytes Present at Higher Concentrations  
in Downgradient UHSU Groundwater Relative to Upgradient UHSU Groundwater  
at the West Spray Field**

<b>Analyte—Metals</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>
Aluminum - total			
Aluminum - dissolved			
Antimony - total			
Antimony - dissolved			
Barium - total			
Barium - dissolved	X	X	X
Calcium - total	X	X	
Calcium - dissolved	X	X	X
Chromium - total			
Chromium - dissolved			
Iron - total			
Iron - dissolved			
Lithium - total			
Lithium - dissolved			
Magnesium - total		X	
Magnesium - dissolved	X	X	X
Manganese - total			
Manganese - dissolved			
Molybdenum - total			
Molybdenum - dissolved			
Potassium - total			
Potassium - dissolved			
Selenium - total			
Selenium - dissolved			
Silicon - total			
Silicon - dissolved			
Sodium - total	X	X	
Sodium - dissolved	X	X	X

**Table 5-12 Summary of Analytes Present at Higher Concentrations  
in Downgradient UHSU Groundwater Relative to Upgradient UHSU Groundwater  
at the West Spray Field (continued)**

<b>Analyte—Metals</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>
Strontium - total	X	X	
Strontium - dissolved	X	X	X
Tin - total			
Tin - dissolved			
<b>Analyte—Radionuclides</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>
Gross alpha - total			
Gross alpha - dissolved		X	X
Gross beta - total			
Gross beta - dissolved			
Radium-226 - total			
Radium-226 - dissolved			
Tritium			
Uranium-233,234 - total			
Uranium-233,234 - dissolved	X	X	
Uranium-235 - total			
Uranium-235 - dissolved			
Uranium-238 - total			
Uranium-238 - dissolved	X	X	
<b>Analyte—Water Quality Parameters</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>
Bicarbonate	X	X	X
Chloride	X	X	X
Fluoride	X	X	X
Nitrate/Nitrite			
Sulfate			
Total Dissolved Solids	X	X	
Total Suspended Solids			

**Table 5-13 Summary of Analytes Present at Higher Concentrations  
in Downgradient UHSU Groundwater Relative to Upgradient UHSU Groundwater  
at the Present Landfill**

<b>Analyte—Metals</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>
Aluminum - total			
Aluminum - dissolved			
Antimony - total			
Antimony - dissolved			
Barium - total			
Barium - dissolved			
Calcium - total		X	
Calcium - dissolved	X	X	X
Chromium - total			
Chromium - dissolved			
Iron - total			
Iron - dissolved			
Lithium - total		X	
Lithium - dissolved	X	X	X
Magnesium - total		X	
Magnesium - dissolved	X	X	X
Manganese - total			
Manganese - dissolved		X	
Molybdenum - total			
Molybdenum - dissolved			
Potassium - total		X	
Potassium - dissolved	X	X	X
Selenium - total			
Selenium - dissolved			
Silicon - total			
Silicon - dissolved			
Sodium - total		X	
Sodium - dissolved	X	X	X

Table 5-13 Summary of Analytes Present at Higher Concentrations  
in Downgradient UHSU Groundwater Relative to Upgradient UHSU Groundwater  
at the Present Landfill (continued)

Analyte—Metals	1991	1992	1993
Strontium - total		X	
Strontium - dissolved	X	X	X
Tin - total			
Tin - dissolved			
Analyte—Radionuclides	1991	1992	1993
Gross alpha - total			
Gross alpha - dissolved	X		
Gross beta - total			
Gross beta - dissolved	X	X	
Radium-226 - total			
Radium-226 - dissolved			
Tritium			
Uranium-233,234 - total			
Uranium-233,234 - dissolved	X	X	
Uranium-235 - total			
Uranium-235 - dissolved			
Uranium-238 - total			
Uranium-238 - dissolved	X	X	
Analyte—Water Quality Parameters	1991	1992	1993
Bicarbonate	X	X	X
Chloride	X	X	X
Fluoride		X	X
Nitrate/Nitrite			
Sulfate		X	X
Total Dissolved Solids	X	X	X
Total Suspended Solids			

**APPENDIX A**  
**Complete 1993 Analytical Database**

## APPENDIX A

Analytical data for the 1993 Annual RCRA Groundwater Monitoring Report are included on 3 1/2-inch disk. The files are located in Directory \93-APX-A in a self-extracting file named 93-APX-A.EXE. These files contain all "Target" analyte records. The names and contents of the file in 93-APX-A.EXE are:

### Solar Evaporation Ponds

SEP93VOA.TXT	Volatile Organic Analytes
SEP93RAD.TXT	Radionuclides
SEP93MET.TXT	Metals
SEP93WAT.TXT	Inorganic Analytes

### West Spray Field

WSF93VOA.TXT	Volatile Organic Analytes
WSF93RAD.TXT	Radionuclides
WSF93MET.TXT	Metals
WSF93WAT.TXT	Inorganic Analytes

### Present Landfill

PLF93VOA.TXT	Volatile Organic Analytes
PLF93RAD.TXT	Radionuclides
PLF93MET.TXT	Metals
PLF93WAT.TXT	Inorganic Analytes

**APPENDIX B**  
**Results of Statistical Evaluations - 1993 Report**

Results from statistical comparisons are given in electronic format on a 3 1/2-inch disk. Five self-extracting files are located in Directory 93APX\_B. The name of each individual file and its contents are summarized below.

<b>Present Landfill</b>	
UHSU	WB
<b>PLFSAS.EXE</b>	<b>PLFBSAS.EXE</b>
plfuanod.out	plfbanod.out      ANOVA results for normally distributed data (dissolved analytes)
plfuanot.out	plfbanot.out      ANOVA results for normally distributed data (total analytes)
plfuanld.out	plfbanld.out      ANOVA results for lognormally distributed data (dissolved analytes)
plfuanlt.out	plfbanlt.out      ANOVA results for lognormally distributed data (total analytes)
plfunpad.out	plfbnpad.out      ANOVA results using nonparametric method (dissolved analytes)
plfunpat.out	plfbnpat.out      ANOVA results using nonparametric method (total analytes)
plfupbnd.out	plfbpbnd.out      Multiple comparisons for normally distributed data (dissolved analytes)
plfupbnt.out	plfbpbnt.out      Multiple comparisons for normally distributed data (total analytes)
plfupbld.out	plfbpbld.out      Multiple comparisons for lognormal data (dissolved analytes)
plfupblt.out	plfbpblt.out      Multiple comparisons for lognormal data (total analytes)
lfnpaupd.out	lfnpabpd.out      Multiple comparisons for nonparametric method (dissolved analytes)
lfnpaupt.out	lfnpabpt.out      Multiple comparisons for nonparametric method (total analytes)
plfulevd.out	plfblevd.out      Levene's Method for normally distributed data (dissolved analytes)
plfulevt.out	plfblevt.out      Levene's Method for normally distributed data (total analytes)
plfuleld.out	plfbleld.out      Levene's Method for lognormally distributed data (dissolved analytes)
plfulelt.out	plfblelt.out      Levene's Method for lognormally distributed data (total analytes)
plfuswnd.out	plfbswnd.out      W-Test Results for normally distributed data (dissolved analytes)
plfuswnt.out	plfbswnt.out      W-Test Results for normally distributed data (total analytes)
plfuswld.out	plfbswld.out      W-Test Results for lognormally distributed data (dissolved analytes)
plfuswlt.out	plfbswlt.out      W-Test Results for lognormally distributed data (total analytes)
<b>Solar Evaporation Pond</b>	
UHSU	WB
<b>SEPSAS.EXE</b>	<b>SEPBSAS.EXE</b>
sepuanod.out	sepbanod.out      ANOVA results for normally distributed data (dissolved analytes)
sepuanot.out	sepbanot.out      ANOVA results for normally distributed data (total analytes)
sepuanld.out	sepbanld.out      ANOVA results for lognormally distributed data (dissolved analytes)
sepuanlt.out	sepbanlt.out      ANOVA results for lognormally distributed data (total analytes)
sepunpad.out	sepbnpad.out      ANOVA results using nonparametric method (dissolved analytes)
sepunpat.out	sepbnpat.out      ANOVA results using nonparametric method (total analytes)

### Solar Evaporation Pond (continued)

UHSU	WB	
<u>SEPSAS.EXE</u>	<u>SEPBSAS.EXE</u>	
sepupbnd.out	sepbpbnd.out	Multiple comparisons for normally distributed data (dissolved analytes)
sepupbnt.out	sepbpbnt.out	Multiple comparisons for normally distributed data (total analytes)
sepupbld.out	sepbpbld.out	Multiple comparisons for lognormal data (dissolved analytes)
sepupblt.out	sepbpblt.out	Multiple comparisons for lognormal data (total analytes)
spnpaupd.out	spnpabpd.out	Multiple comparisons for nonparametric method (dissolved analytes)
spnpaupt.out	spnpabpt.out	Multiple comparisons for nonparametric method (total analytes)
sepulevd.out	sepblevd.out	Levene's Method for normally distributed data (dissolved analytes)
sepulevt.out	sepblevt.out	Levene's Method for normally distributed data (total analytes)
sepuleld.out	sepbleld.out	Levene's Method for lognormally distributed data (dissolved analytes)
sepulelt.out	sepblelt.out	Levene's Method for lognormally distributed data (total analytes)
sepuswnd.out	sepbswnd.out	W-Test Results for normally distributed data (dissolved analytes)
sepuswnt.out	sepbswnt.out	W-Test Results for normally distributed data (total analytes)
sepuswld.out	sepbswld.out	W-Test Results for lognormally distributed data (dissolved analytes)
sepuswlt.out	sepbswlt.out	W-Test Results for lognormally distributed data (total analytes)

### West Spray Field

UHSU/Surficial Deposits		
<u>WSFSAS.EXE</u>		
wsfuanod.out		ANOVA results for normally distributed data (dissolved analytes)
wsfuanot.out		ANOVA results for normally distributed data (total analytes)
wsfuanld.out		ANOVA results for lognormally distributed data (dissolved analytes)
wsfuanlt.out		ANOVA results for lognormally distributed data (total analytes)
wsfunpad.out		ANOVA results using nonparametric method (dissolved analytes)
wsfunpat.out		ANOVA results using nonparametric method (total analytes)
wsfupbnd.out		Multiple comparisons for normally distributed data (dissolved analytes)
wsfupbnt.out		Multiple comparisons for normally distributed data (total analytes)
wsfupbld.out		Multiple comparisons for lognormal data (dissolved analytes)
wsfupblt.out		Multiple comparisons for lognormal data (total analytes)
sfnpaupd.out		Multiple comparisons for nonparametric method (dissolved analytes)
sfnpaupt.out		Multiple comparisons for nonparametric method (total analytes)
wsfulevd.out		Levene's Method for normally distributed data (dissolved analytes)
wsfulevt.out		Levene's Method for normally distributed data (total analytes)
wsfuleld.out		Levene's Method for lognormally distributed data (dissolved analytes)
wsfulelt.out		Levene's Method for lognormally distributed data (total analytes)
wsfuswnd.out		W-Test Results for normally distributed data (dissolved analytes)
wsfuswnt.out		W-Test Results for normally distributed data (total analytes)
wsfuswld.out		W-Test Results for lognormally distributed data (dissolved analytes)
wsfuswlt.out		W-Test Results for lognormally distributed data (total analytes)

**APPENDIX C**  
**Results of Comparative Statistical Evaluations**  
**for 1991, 1992, 1993**

Results from statistical comparisons are given in electronic format on a 3 1/2-inch disk and are located in Directory 93\_APX\_C. Results are given in a separate directory for each year (1991, 1992, and 1993). Three self-extracting files exist within each directory, one for each RCRA-regulated unit. Individual file names and their contents are the same as those listed for UHSU in Appendix B. File names for each RCRA-regulated unit are the same for each year.